INDUSTRIAL MEDICINE AND SURGERY

INDUSTRIAL MEDICINE

The Journal of Medicine in Industry

This Journal is dedicated to the advancement of sound industrial medicine, including the surgery of industrial trauma. To that end its varying contents will embrace scientific papers, reports, digests, news items and official statements, together with editorial comment. The editorial policy is to avoid undue censorship. Some contributions ably prepared will be published although contravening the personal opinions of the editors. Care will be exercised in checking the accuracy of known facts, as printed, but in all other respects statements and opinions are those of the author and may not be shared by the editors. On any article, the editors reserve the right to comment favorably or otherwise, in the current or any subsequent issue. On this basis, contributions are invited. The opinions expressed in any contributions, including the editorials of this Journal, do not necessarily reflect the attitude or opinions of any associated organization.

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Synergistic and Antagonistic Physiological Effects of Exposure to Multiple Air Contaminants

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IT HAS always concerned industrial physicians and hygienists that a joint action of multiple air contaminants may create specific health hazards. Interaction is known to take place *in the air*. It may lead to the formation of injurious compounds through photosynthetic processes or chemical reactions. Likewise, the potentiating or neutralizing influence of a particulate on the effect of a gas or vapor is, in general, the result of interaction in air. Joint action, however, can occur also *in the body*.

Multiple agents may be present in *identical* or *different physical states*. Exposure to two or more gases or vapors that have the same biologic target may inflict injury greater than the sum of their individual effects. This is true even if the mechanisms of action differ; Stokinger *et al*[1] have discussed the complexity of this phenomenon. Thus, old reports[2] on joint effects of carbon monoxide and hydrogen sulfide or of hydrocyanic acid and oxides of nitrogen may refer to potentiation. A 2% carbon dioxide-air mixture has been found to enhance the toxicity of ozone for guinea pigs, probably by increasing the rate of respiration.[3]

In industrial toxicology, the possibility of a joint action of solvent mixtures is of great practical interest and, hence, has been the object of some research. Mixtures of benzene and its homologues have been studied in animal experiments by a number of authors. While the acute vapor toxicity appeared somewhat increased, probably due to the presence of the more narcotic toluene, extended exposure had virtually the same effects as exposure to benzene alone. According to Hough *et al*,[4] pure benzene appeared more toxic to dogs than a mixture of 60% benzene, 30% toluene, and 10% xylene. It is not surprising that the same effects on the blood-forming tissues were found in both extended exposure to benzene alone and extended exposure to a mixture of benzene and its homologues, since it is extremely doubtful whether the latter or their metabolites act on the blood-forming tissues.

A mixture of solvent vapors with identical sites and mechanism of action but different degrees of toxicity has been studied by LaBelle and Brieger[5] in acute and extended animal experiments. The preparation was of the following composition:

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methylethylketone, propylene formal, 1,3-amylene oxide, tetrahydrofuran, 1,3-butylene oxide, dimethyl acetal, propylene acetal, acetone. The effect of exposure to the mixture did not differ from the effect of exposure to the main component, methylethylketone (55.7%). McCollister *et al*[6] have reported on studies of the toxicity of fumigant mixtures, with particular consideration of possible potentiating effects. The mixtures contained ethylene dichloride and carbon tetrachloride in various proportions. Potentiating effects were indicated in the acute oral LD_{50} values and in the acute vapor LC_{50} curves but the differences, although of slight statistical significance, were so small as to be of no practical importance from the viewpoint of industrial hygiene. No indication of potentiation was found when a comparison was made of the maximum intensities of single vapor exposures without detectable injury.

Little is known of the effects of composite solvent vapors on man. Information on the synergistic action of two solvent vapors is contained in a report by Smith and Mayers.[7] Severe intoxication, including convulsions and loss of consciousness, was observed after exposure to methylethylketone and acetone in subtoxic concentrations (298 to 560 ppm and 330 to 495 ppm, respectively). Quadland's[8] survey of reports on occupational diseases attributed to volatile solvents lists poisoning by mixtures of carbon tetrachloride, benzene, and petroleum solvents. Signs and symptoms observed in several of these cases indicate rather a composite clinical picture of poisoning, i.e., the presence of different toxic effects. A synergistic effect of toluene and butyl acetate has been described by Parmeggiani and Sassi.[9]

Marked potentiation in mammalian toxicity from the simultaneous oral administration of two anticholinesterase compounds, EPN and malathion, has been demonstrated recently by Frawley *et al.*[10] These findings certainly have a bearing on the hazard of exposure to the mists of these preparations.

All findings mentioned so far are derived from animal experiments and experiences in man. However, the effects of joint action can also be calculated by using Finney's[11] ingenious mathematical procedures. Their application may be useful, but it has to be taken into account that the dosage-mortality data for two individual materials must be fitted by parallel probit regression lines. Hence, the use of Finney's methods is limited.

Little evidence of physiologic *antagonism* of multiple agents in the same physical state has been produced so far. Some isolated experimental observations, as a decrease of the toxicity of ozone administered in pure oxygen,[3] need corroboration and explanation. One well-known example of antagonistic action is the inhibiting effect of aluminum dust and other agents on the development of silicosis. Metallic aluminum as well as iron particles[12] act by increasing phagocytosis — in our own experience an unspecific action of particulate matter — and thus removal of silica deposits; the solutes of aluminum hydroxide, magnesium carbonate, gypsum and clay may form less injurious silicates.

Most of the research dealing with the joint action of two or more agents in *different physical states*, i.e., particulate and gaseous matter, does not come within the scope of this presentation since it refers in general to processes that take place in the air. However, potentiating synergism or subtractive antagonism of a combination of particulate and gaseous matter is not necessarily the result of interaction in air. Pattle[13] was able to show that sulfur dioxide in combination with smoke generated from a kerosene lamp was more lethal to mice than the same concentration of sulfur dioxide alone. Under the conditions of these experiments, sulfur dioxide was not adsorbed on the smoke in quantities sufficient to render the smoke an irritant. In addition, sulfur dioxide was desorbed rapidly prior to the inhalation of the smoke. The greater toxicity of the sulfur dioxide-smoke mixtures has been attributed by the author to the blocking action of the smoke on bronchi and alveoli. In other words, no true interaction in the air or in the body but an additional injury took place. Smoke previously inhaled had a protective effect. The mechanism of this antagonistic effect cannot be explained fully, but it is probably also the result of a second physiologic process such as the reduction of the respiratory volume or shielding of the mucosa and alveolar epithelium by the smoke particles.

PHYSIOLOGIC synergism and antagonism of multiple air contaminants are theoretically and practically important, yet little is known of them. Joint physiologic action does not necessarily mean integration of two or more actions but may consist of two or more independent processes leading to a common effect. Synergism is either simply additive or potentiating. It is the latter that holds the greater interest. Antagonism is subtractive. However, according to pharmacodynamic conceptions and findings, both synergism and antagonism may produce qualitative but not quantitative changes.

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Management and Medicine Meet

I ATTENDED an unusual meeting recently. There were 47 management executives and 32 doctors, all connected with some of our larger industries, insurance companies, utilities, universities, and unions. They met for two days at beautiful Lake Logan in North Carolina to discuss ways of providing better medical care outside of the shop. It was good for the executives and doctors to know first-hand the others' point of view. There were six groups, with 12 to 13 persons in each, discussing the social and economic forces which are changing our medical care patterns, how medical care should be provided, to whom and to what extent it should be rendered, how its cost should be met, what part insurance plays in it, and how medical programs and abuses can be controlled. It was my privilege to be leader of the group on how medical care should be provided. Six of us were doctors and six were from the management side. We didn't agree about everything, but we did believe that changes are taking place and that there is a trend toward management paying for more and more of the medical care bill. This is happening through health and welfare negotiations. Benefits are provided by Blue Cross, Blue Shield, and commercial insurance. Some service comes from community and union centers. There was discussion, of course, about the ability of a private solo-practitioner to furnish all the services needed. It was pretty much agreed that group prepaid programs, with free access to specialists, can provide medical care at a more reasonable price. This was thought to be a satisfactory way to budget medical care costs. The fact that there is an increasing desire for more comprehensive medical service was given as the reason for the establishment of union medical centers and other group practice arrangements. Another phase of the subject discussed by my group was whether industry would exert an increasing control over medical care provisions since they are paying more of its cost. If management pays the bill it will want to know whether they are getting their money's worth. "He who pays the piper calls the tune." In such an arrangement, management or the insurance companies or the unions are considered by the doctors as third-party interference. Doctors for the most part want all medical care to be managed only between themselves and their patients. We all agreed that a sympathetic close relationship between doctor and patient is desirable, but perhaps some of that has to be sacrificed to secure more comprehensive care on a group basis. Improved techniques of diagnosis and treatment demand specialists with exceptional skills. Human relationships become secondary. I heard a woman complain recently because she saw the surgeon who operated on her only twice, once in his office and once in the hospital. Beyond that, his assistants took over. To serve the greatest number of people he had to depend on assistants for the less important parts of the treatment. Such a situation is part of a changing world. This whole subject of how to obtain better medical care at a reasonable cost is fascinating, and this Conference brought out many new thoughts.

—From "Live a Little Longer," DR. WILLIAM A. SAWYER'S column, in *The Machinist*, June 6, 1957.

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Management Development in Medicine

The Sappington Memorial Lecture

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IT WAS NOT my good fortune to know Dr. Clarence Olds Sappington personally, as I am sure many of you did. However, perhaps it is just as well, as it illustrates how the good that men do lives after them. Dr. Sappington was born in Kansas City, Missouri, in 1899, and received his A.B. in 1911 from Whitman College, Walla Walla, Washington, and his Doctor of Medicine in 1918 from Stanford University. He early became interested in industrial medicine by his affiliation with the Pacific Coast Ship Building Company in 1919, and in 1924 he was the first American to receive the degree of Doctor of Public Health from Harvard. From that time on, the rest of his life was a long series of accomplishments in the field of industrial health — many of them being of a pioneering nature. Truly, he may be looked upon as one of the founding fathers in this field. There is one interesting note which may foreshadow some of the things that I am about to say to you, and that is this: Dr. Sappington was a member of the Executives' Club of Chicago, and was undoubtedly interested in the question of today: Can medicine learn greater efficiency from the experiences of industrial organization?

Theme

THE MAIN theme of my discussion is the lack of executive administration in physicians, hospitals, and medical organizations whether they are in industry or out of industry. I want to explain our plan of management development in the hope that these procedures can be translated into medical fields.

Personal Situation

I DO NOT want to stand here under false pretenses even though I am a Past-President of the American Institute of Chemical Engineers and of the Society of Chemical Industry of Great Britain. I still have nothing but a B.A. in chemistry. As a matter of fact, during the period when I was President of the Society of Chemical Industry, I got a great kick out of having my name at the top of the masthead with the simple B.A. after it, whereas, everybody else's name (according to the British custom) had a whole string of F.R.I.C.'s, and so on. Perhaps there is something in the idea put forth by the zoologists that man has reached his present state as a result of his relative lack of specialization. I am sure that I can qualify as to this lack, and do not want you to think I am more of an authority than I am. As a matter of fact, I have only had two hospitalizations in my life outside of a few checkups. We must always remember that it is only the expert who is sure that things cannot be done.

I want you to know I realize that men are not things like chemicals, and that, though much progress has been made and much more will be, medicine will never be an exact science. However, have you ever stopped to think of the amount of faith our so-called science asks us to have? No one has ever seen an atom or any of its parts and the chances are very good that they never will. More people believe in the electrons they can't see than in the God equally invisible.

Parallelism Between Organizations

THE TIME of civilization itself is such a small portion of the life of man since he became man that in all areas of activity by far the longest period was that of individual effort — hardly to be called organization at all. The next longest period was that often called the cottage industry where, for instance, in textiles each man had his own loom in his own house, selling to and taking orders from merchants. The same type of organization is seen far and wide in the world today, where the proprietor of a small shop manufactures his goods himself in a rear or upstairs room. However, as the cigarette advertisements say, "Something new has been added." The weaver, for instance, has to consider the wants and desires of his customer rather than what would please himself alone. In all industry this factor has been growing until it has become controlling.

Presented at the Opening Session of the Twelfth National Industrial Health Conference, and the Forty-Second Annual Meeting of the INDUSTRIAL MEDICAL ASSOCIATION, April 23, 1957, at St. Louis, Missouri.

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When we move to the small factory, we have an immediate increase in efficiency. One man can now attend to several looms, and with this increase in efficiency comes lower costs, with competition eventually forcing lower prices. Anyone who studies history, even that of a couple of hundred years ago, is struck by how little the individual of that time possessed. With the advent of the small factory, we have also the beginning of crude management — usually by the owner and sometimes by a genius. Oftentimes the factory was a one-man show which, upon the loss of the manager, promptly went to pieces. This is the origin of the saying, "Shirt sleeves to shirt sleeves in three generations." With the factory, the use of capital entered in a large way. Profits were made and largely put back into the business or into another one. Nobody thought of taking up collections to support a factory which could not support itself.

Finally we came by degrees to the large manufacturing plant of today or even of yesterday, with division of labor, assembly lines, time studies, and a management team of the highest possible efficiency and nearly always professional rather than owner. The split between the management of industrial organizations and ownership is of the highest importance. If, however, any of you are thinking of buying a company be sure to ask *who* they have as well as *what*. Research is provided for, not only in technical fields but in management methods themselves. New managers are trained to take the place of the old and to provide for expansion.

There is still no collection; in fact, nowadays industrial concerns are looked upon as a source of income for the charity called government, and for private charities themselves, and is still expected to make enough money to pay the stockholders for their investment, to expand the business, and to persuade outsiders to contribute their capital as well.

Management accepts that challenge, and to a surprising degree wins.

In a technical industry such as I have been familiar with all of my life, there has been a tremendous push of technical men into management with the consequences — first, that we are very short nowadays of supplies, particularly of engineers, and second, that we have built for ourselves the problem of the technical man who doesn't want to be a manager. There are more of these than you think, and we are all struggling with the problem of seeing that their rewards are commensurate with what they deserve. I hope that the medical industry will take advantage of these experiences and avoid getting itself into a similar situation.

When we look at the analogous development of the medical industry, we see that the longest period again was one of highly independent operation by the local medicine man. Maybe a few of them got together and swapped spells, but I doubt it.

We still have with us the analogue of cottage industry in home visits and office hours. Both of these, and particularly the former, cause inefficient use of the doctor's time. Although I have no figures to back it up, my guess is that there is as big a shortage of doctors as there is of engineers, and the likelihood of solving this shortage is probably less than in the case of the engineers.

With the hospital we have the analogue of the early factories. Actually, if one analyzes the design of hospitals, we really have (like the hotels) a bunch of single homes thrown together. Even in the wards patients are more easily visited, and the doctor merely gets around with less lost motion. To be sure, this generalization (like most) is not entirely true, and we have in the hospital the beginnings of specialist service and the availability of more machinery.

However, with the coming and growth of the clinic, we begin to get the use of modern principles, of division of labor, saving of time, and improvement in efficiency. Almost anyone who has had any experience with clinics will tell you that they still have a long way to go. I remember going through one on the East Coast and my whole activity for one of the days was a 15-minute test. This could hardly be called a day of accomplishment. Hence, I am convinced that even here there is a huge chance for improvement to make a showing.

Hospitals and Clinics as Businesses

IN MY opinion, the great question before management is: Can hospitals and clinics be so redesigned that they will make profits, pay dividends, and, consequently, be able to raise capital for themselves and stop being charities?

The present method (which probably seems to you immutable) is merely a heritage of the past. Every business needs self-study and self-criticism. I would really like to see a good hotel manager take charge of a properly designed hospital. Think of how he would feel in being able to crowd 50 patients in one room. Have you ever sat in a hospital corridor and wondered what all the hurly-burly was about? Do hospitals have job descriptions so that each employe knows to whom he is responsible and what his duties are? Are they counseled periodically as to how they are carrying them out? Are they ever talked to about their defects and shown how to improve themselves? Remember, you can always afford to pay for efficiency, and you can never afford to do without it.

No one can sell a product at a profit that everyone dislikes. Did you ever know anyone who did not want to get out of a hospital as fast as

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he could? The first step to business success is to have something that people desire, and if desire can be tacked on to need, such as for instance in the food industry, so much greater are the chances of success. I am sure you will agree with me that much has been accomplished by the Blue Cross and other insurance ventures in the way of building up profitable business for both doctors and hospitals. Indeed, there is some likeness here to what I have been told is the Chinese approach, namely, you pay the doctor while you are well and stop paying him if you get sick. I have never known how the latter condition was decided upon or by whom, but Chinese wisdom is not to be thrown away lightly.

We have heard much of the so-called charity work, and I strongly suspect that if nobody expected it, much of it could be eliminated. No one thinks of getting free food at a grocery store, and it is only human nature to look for things free, if they are available, and not to appreciate them.

I would propose a management study of hospitals and clinics, the construction of management development systems for nonmedical trainees, and a setting up of the ideal of getting out of the charity business with the idea of putting the institution on a profitable basis. With the proper mental approach and the modern tools we have, I believe that it can be done — at least I would like to have it proved to me that it cannot. I know it won't happen next year or the year after, and maybe it is being done somewhere and I am ignorant, but at any rate I am sure that if such an ideal could be attained, there would be fewer doctors who would die of coronary thromboses and a greater number of people who would receive the treatment they need. Also, I have a dim idea that the type of hospital or clinic that comes out would not be much like the present.

The Making of a Manager

ONE THING is certain, we are looking for men in this management field who will be bosses, not on technical medical matters, but on administration. We would probably have the opposite trouble to what the chemical industry is going through now, namely, they would have too many specialists to deal with rather than too few, but this is just one of the many problems.

Maybe some such managers can be picked off other organizations, but in the long run they will fundamentally have to be developed by yourselves. However, I can tell you how we do it for ourselves, which may be of some value to your thinking.

If we accept the dynamic thesis that we do not have to take just what we can get but that we can make managers, we must evolve some kind of program to do so; and here, again, we are faced with two points of view on how to bring about the result we wish to obtain. Most of us, particularly of the older generation, were brought up by the "sink-or-swim method" which is highly effective when there are great reserves of talent which can be wasted in the inefficiency of the process. The position of the United States today in leadership shows that the system has worked, but it worked in the same way as all of our processes of frontier economy. Where nature is boundless, why worry about conservation? But nature is no longer boundless and it is time for us to husband and utilize our human resources as efficiently as we have come to realize we must do with our natural ones. Instead of allowing men's careers to proceed in a haphazard manner, they must be designed so that there will be as few holes in experience as possible, and as high a yield of finished product from the over-all potential candidates as we can obtain with the best of our efforts.

We start out, therefore, on the most delicate of jobs, the development of a human being. It is with regret that we must admit that we are still dealing very much with an art and very little with a science.

The setting up and the handling of a program such as we are talking about requires someone with warm understanding and sympathy — someone who cares — who is not a cold fish armed with numbers and statistics and a belief in the efficacy of rules. Here is where the small organization can have an advantage over the large. Where everyone knows everyone else there is a better chance that a potential manager will not be smothered by an unimaginative and unsympathetic lower executive so long that the possibilities have withered. As organizations grow bigger, the personal element can be lost. Job classification systems and salary plans can be built by little minds into straitjackets. The making of a manager first requires humanness at the top, to correct the dead hand of the statistical approach and bring back some of the intimacy of earlier days.

Choosing the basic raw material is the weakest link in our program, the most difficult to carry out with high efficiency. In our industry it is our belief that the great majority of candidates will be technical graduates, but it would be folly to make this an exclusive rule.

In picking our raw material, we must remember that, contrary to a popular impression, the world does not belong to the extroverts, even in sales. The insensitiveness of the complete extrovert is not likely to make him a good manager of others, or to give him much insight into the problems and thinking of men whose background may be quite different from his own. In another way, the same thing is true of the ultraintrovert who cannot get outside of himself enough to

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take any interest in anyone else. In other words, what we are saying is that both extremes should be avoided, and that a liberal variety in a given company will make for greater success than concentration on any particular type.

Another factor that cannot be stressed too strongly in dealing particularly with men in their twenties, is the well-known fact that people grow up at different rates, and the so-called slow-grower who matures rather late will usually be found to have a good deal more of value than the flashy candidate fully developed at 21. The chances are that the word "flashy" is only too true.

While attention is paid to the raw materials from the standpoint of potential managerial ability in the initial hiring, we do not know enough about the candidate at that stage to be able to set him aside, particularly for managerial development. He should carry on whatever normal training the company provides, and, after two or three years of employment, we will be on sounder ground in assaying his possibilities.

In the training of executives we are dealing with that period beyond what might be called a normal training course given to everybody, whether that be a formal or informal one. Any system of executive development must, by the very nature of the problem, have extreme flexibility. Above all, these are the men who do not come out of a mold and should not be forced into one. We have talked about the importance of the type and character of the head of the program, and I believe it will be highly desirable to have working with this head a group of advisers of recognized managerial stature, each of whom, to a certain extent, will take over, not exactly the direction of, but what we might call personal contact, with a few of the trainees.

It is extremely important that all the time the trainee is going through the executive development program, which is likely to be a dozen years, he should be holding down a job. By this time in his life he should have grasped a great many facts, but if he is to be a manager, he needs to develop judgment, and no one ever learned judgment from a book or a lecture. It has to be learned by trying, failing, getting up, and trying again.

We may consider that in our industry there are four major fields: production, research and engineering, sales, and finance. Of course the ideal would be to have a manager who knew all four of them, but such would be very rare. He should, however, know well a minimum of two, and three if possible. The only way a young man can get this knowledge is by deliberate job rotation, spending three or four years in each field. That this is difficult to attain will be agreed by anyone who has tried to arrange such transfers. One of the grave objections is that when a man is transferred from one field to another, to a certain extent he has to go in at the bottom, and, particularly if he is on the second or third rotation, his salary at that point is higher than the division or department would normally pay for the service it is getting, and as most divisions or departments are fairly budget-conscious, resistance is encountered. It seems to me that the wisest way to handle this situation is to create a personnel fund out of which would be paid the difference between the trainee's salary and that which the division or department normally pays for the service he is to perform. This may sound unnecessarily complicated and it really is unnecessary, but we have to deal with human nature at every point in the line, and we get so many problems that we don't know how to solve that I feel it wiser to solve this one in the simple way indicated, because, quite outside of the financial part, most divisions and departments are rather loath to spend time training people that they are not going to keep.

How are we going to measure him? We measure him by the same criteria by which we chose him, namely, skilled human judgment backed by such mechanical tools as may be available. Most companies now have what are euphemistically called reinterview systems; in other words, periodically a man is interviewed by a superior almost as though he were a new candidate, his faults pointed out, his good points mentioned, and an opportunity given him of voicing his opinions. Executive development candidates should be handled in the same manner but more frequently, and on top of that, should be reinterviewed by their advisers and occasionally by the program head. With a record of 10 to a dozen years back of him under this system, it should not be hard to decide the desirability of the man for a particular position which may be available.

A manager cannot have enough practice in leadership, and, therefore, those who are seeking this field should try their wings in civic and religious activities, technical societies, and any other place where they can find opportunities for such practice. The real potential manager will go out after such opportunities and not wait for them to come to him.

We should focus on the need for the making of managers by a process and a program which is conscious, rather than depend on the unwitting forces of chance. While it is probably true that there is always sufficient talent potentially existing, it is probably equally true that much of it is lost through lack of opportunity and lack of sympathetic training. Many a man is alive today because of penicillin who would have been dead without it. Spiritual penicillin is needed to help careers over the humps as well as material for the crises of bodily diseases.

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Industrial Health

UP TO NOW we have been talking about the medical industry itself, and I would like to refer to the tremendous potential of this industry when teamed up with public and industrial health in the field of preventive medicine. The surface of opportunity in these two fields has hardly been scratched. I can remember in my earlier years the seriousness with which "having the doctor" was looked upon. Most people felt that anyone that sick was a candidate for an immediate coffin. So the little things — the important signals — were disregarded and many people died.

As far as industrial health programs are concerned, it is probable that an internal organization would be better for the larger companies, but an external can do very well for the smaller organizations and even for the smaller plants of large ones.

In most organizations the doctor and manager are rolled into one person. I believe this will change rather quickly in large organizations, and particularly in those like the oil companies which are scattered over large areas.

The role of the manager (and this is possibly distasteful to the medical man) is to keep the idea sold by calculating and showing savings and profits, by developing ideas to expand the use of the medical organization and to show profits from such extensions. However, the constantly higher costs of insurance is becoming a nice plum to hit at. When our Traffic Department gets a new rate which shows savings it has no hesitancy in sticking them under the nose of top management. Why should not the Medical Department do the same thing?

Conclusion

I WANT to return to the point of self-study and self-criticism. With all of our management development programs, every so often we bring in a firm from outside to criticize the way we are doing things. We can almost take it for granted that the way we have been doing things all of our lives is not now probably the best — though it could be. We must go out for big radical changes and not for the light fringe issues. Any well-trained manager can handle a bunch of prima donnas better than any one of them can do it himself.

Prolonged Illness-Absenteeism

THE RATE of prolonged illness-absence is greater among women workers than among men; greater among production workers than among salaried personnel. It rises markedly by age. From this we can conclude that production lines are hardest hit; that experienced workers, in whom there is an investment of training and whose skills can least be spared, are more frequently absent. The much higher rates among older workers should not suggest that prolonged illness-absence is exclusively or even essentially a problem of geriatrics, that we are coping only with terminal and permanently disabling disabilities, and that, therefore, programs of prevention are not too realistic. Half of the absentees are well under 50 years of age. The great majority return to work. The most frequent disabilities, responsible for two-thirds of the absences, are diseases of the digestive system, diseases of the circulatory system, accidents, diseases of the genitourinary system, and diseases of the respiratory system. These are listed in order of descending frequency. Half of the digestive disabilities involved appendicitis and hernias. Ulcers were responsible for approximately 16% of the absences in the digestive system group. Absences resulting from diseases of the heart totaled somewhat less than half of those reported as due to diseases of the circulatory system. This evidence does suggest that it is practical to consider steps that might lead to prevention.

—From the Summary Chapter in "Prolonged Illness-Absenteeism," published by Research Council for Economic Security, Chicago.

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A Re-examination of the Picture of Plumbism

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FROM time to time it is necessary to re-examine the older clinical entities in the light of existing knowledge. This is particularly pertinent to plumbism. Diseases of a communal nature are periodically reviewed as to their etiology, pathology, and systemic involvement. Older diseases become more clearly defined under the scrutiny of newer scientific developments and the application of epidemiology. When this is done, textbooks on general medicine contain revised descriptions of these diseases, omitting statements no longer tenable.

Unfortunately the authors of textbooks on general medicine or certain specialties have not applied the same method in dealing with the occupational diseases, notably lead poisoning. Ancient physicians described lead intoxication in a manner with which we have no basis for quarrel. In the centuries that followed, workers exposed for indefinite periods of time and with no environmental control developed intestinal colic, peripheral palsy, or an encephalopathy. Here again no one would dispute that classification.

But during the passing years, to the entity of lead poisoning all things were added. Noting that hypertension and arteriosclerosis were prevalent among elderly lead workers, the early writers ascribed the cause to exposure to lead. Other systemic conditions were also attributed to lead, such as the contracted kidney, gastric ulcer, liver disturbances, hypertrophy of the heart, pulmonary emphysema, pneumonia, pneumonitis, bronchitis, gout, ad infinitum. When one traces the authorship of such observations one finds they date back to 1728, 1791, 1802, and subsequent years, prior to the advent of epidemiology.

The theme of this paper is not concerned with facts and fallacies of our early writers. This paper is concerned with authors of modern textbooks or the editors of multi-authored books on general medicine who indulge in lengthy descriptions of communal diseases and then, as a sort of afterthought, devote a brief chapter to a few "industrial poisons." Lead is always included. For instance, a widely used textbook on Internal Medicine, revised two years ago, states that the manifestations of lead poisoning are "intestinal colic, encephalopathy, peripheral neuritis, and anemia." No attempt is made to explain under what circumstances or manner of exposure one might find encephalopathy or peripheral neuritis. It does not state that these are rare manifestations. Such generalizations are certain to confuse the student or inexperienced physician as well as does the perpetuation by reiteration of outmoded opinions regarding the relationship of plumbism to hypertension, arteriosclerosis, gastric ulcer, hepatitis, and other diseases.

The character of industrial lead intoxication *today* is as follows: The worker first notices an increasing fatigue. Within the next few weeks he becomes constipated and has almost constant dull headaches. The constipation is accompanied by or soon followed by intestinal colic, either mild or severe. In my experience the more nearly constipation approaches obstipation the more severe the colic. Often with the relief of the constipation there is a marked diminution or disappearance of the colic. If constipation is severe nausea, vomiting, and anorexia may be present. Pain in the muscles or bones is an occasional complaint.

In the physical examination there is little that is specifically diagnostic. A lead line of the gums may be present, and, if so, usually induces erroneous conclusions. I find myself wishing that this phenomenon had never been reported in the literature, since too many physicians accept its presence as an indication of intoxication instead of absorption. There may be a slight temporary elevation of the systolic blood pressure. Generalized mild-to-moderate tenderness of the abdomen is frequently present, often more readily elicited in the area of the umbilicus. There are no signs indicating encephalopathy; there is no peripheral neuritis, no tremor, no wrist drop, and no measurable weakness of the extensor muscles.

It is obvious that I have depicted a mild gastroenteric type of plumbism. To do otherwise would be contrary to a considerable experience with this

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still fairly prevalent disease. Admittedly it is possible that in some remote, uncontrolled process a worker could develop peripheral neuritis or lead encephalitis, but few physicians will ever see such a case today. There are good reasons why he will not. Modern industry has wisely utilized the preventive measures made available to it. But even in their absence or failure the American worker, being more intelligent than his counterpart of the past, readily and early assumes that any symptoms of ill-health noted by him may be due to his industrial exposure. He *does not postpone* seeking medical care until he is seriously ill. Furthermore his foreman or shop steward is alerted to the possibility of intoxication, and any complaint of illness results in a quick referal to the company doctor.

Diagnosis

THE DIAGNOSIS of lead intoxication is not as simple as is commonly considered. It is often erroneous to base a conclusive diagnosis upon a history of exposure to lead, a complaint of intestinal disturbance, and a report of an elevation of the blood or urine lead levels — as is illustrated in the following two cases:

CASE I: J. A. had been a spray and brush painter for 28 years. Recently he consulted his physician because of epigastric pain, nausea, and flatulance. After obtaining the occupational history the doctor sent whole blood to the laboratory for a determination of the lead level. It was reported back as being 0.07 mg/100 ml. On the routine laboratory form it stated that the normal blood lead level was 0.0 — 0.05 mg/100 ml. The occupation, the type of complaint, and the assumed increase over the normal blood lead level induced a diagnosis of lead poisoning. The worker was withdrawn from his job and prescribed calcium EDTA. No improvement occurred. Some weeks later after consulting a different physician, a G. I. series revealed a duodenal ulcer. Likewise an investigation of the industrial environment revealed the worker to be an "inside" house painter who had not used paint containing lead for the previous five years.

CASE II: J.K.J. was employed as a utility and repair man for a Los Angeles company for the past 11 years. His duties were varied and included occasional sand blasting, cleaning shop floors, checking fire equipment, and, at intervals, painting equipment. Suddenly in August, 1956, he developed a tingling and numbness of both legs. He complained of weakness but could walk. After consulting his family physician he was instructed to collect a 24-hour specimen of urine. The laboratory reported the presence of 3.85 mg per liter. Upon this basis he was diagnosed as having lead intoxication. Two weeks later the patient was hospitalized by a consultant at which time the 24-hour specimen of urine revealed 0.02 mg per liter. On questioning the patient it was learned that when he collected the 24-hour urine at home for his family doctor he used as containers three Mason jars he had found in his garage.

These two cases teach one common lesson, namely, the laboratory report induced an erroneous diagnosis. In the first instance the doctor felt that a reading of 0.07 mg/100 ml was above the normal stated by the laboratory and therefore the patient was "leaded." He made no effort to determine if a lead exposure existed, and he was not aware that to many toxicologists 0.07 mg/100 ml is not abnormal. In the second instance the method of collection is obviously to be condemned. A physician must realize that many hospitals as well as independent laboratories are not experienced or equipped to run tests for lead in urine or blood. He should choose his laboratory with care. He should question each reported amount and evaluate the figure with the history of exposure and the clinical findings. Also it must be remembered that typographical errors do occur, and a misplaced decimal point can lead to an erroneous diagnosis.

As a further aid to diagnosis and a better understanding of the etiologic background of occupational diseases, the on-call and part-time industrial physician has been urged to visit from time to time the plant or plants he serves in order to familiarize himself with the process or processes involved. I would not belittle such advice, but I feel we are a bit naive if we expect such occasional visitations to be sufficiently informative. It would be ideal if these physicians could take formal courses in industrial medicine, but this is not always feasible. As an aid in self-education and to augment observations made in the plant I have the following suggestion:

In addition to textbooks on occupational medicine and industrial hygiene, the office library should have a book, edited by R. Norris Shreve, entitled "The Chemical Process Industries," published by McGraw-Hill. Here one will find a detailed description of practically every basic industry in America. One can learn what materials are used in the ceramic industry, in making paint or cement or the plastics, or "cracked" gasoline, perfume, paper, soap, dyes, etc. In addition to this book I would suggest a book on Industrial Chemistry, and finally a book entitled "Clinical Toxicology of Commercial Products," by Gleason, Gosselin and Hodge, published by Williams and Wilkins. This contains a large section devoted to trade name products, their use, chemical ingredients, and the manufacturer. If this article is worthless in all other respects, the suggestions found in this paragraph should redeem it.

To continue with the diagnosis, the only way one can differentiate between mere absorption and that of intoxication is to determine the lead

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level in the blood or urine or both. Hematological studies are done to determine the presence of stippled cells and evidence of anemia. In the ordinary office practice the 24-hour collection of urine is not always practical. There exists the element of delay in deriving the information sought and the possibility of contamination. In most instances a blood analysis will suffice. For purposes of screening large groups of workers, stippled cell counts, or McCord's basophilic aggregation test, or the porphyrin test of the urine have their advocates. In my particular type of practice these methods are not utilized.

To carry out the principles of preventive medicine in industry it is frequently necessary to have a chemical air analysis of the working environment. This can be done by the Division of Industrial Hygiene of the state, county or city, or by a private agency.

Mention was made previously of a case in which the physician involved interpreted the lead blood level of 0.07 mg/100 ml as indicative of lead intoxication. His assumption was based upon the printed normal figures on the laboratory report in which the normal was stated as being between 0.0 — 0.05 mg/100 ml. For reasons not historically apparent most toxicological laboratories adhere to printed forms which give the normal mean value of blood as 0.0 — 0.05 mg/100 ml, and for urine 0.0 — 0.08 mg/liter. What should be considered normal? There is as yet no definite answer to this question. Variations of opinion are expressed by official agencies as well as by experienced investigators. J. J. Bloomfield, Assistant Chief Public Health Service, Division of Industrial Hygiene states, "Lead intoxication occurs rarely, if at all, and only in its mildest manifestations among regularly employed industrial workers, if the mean urinary lead concentration of representative groups of such workmen is kept below 0.10 mg per liter and if the exposure is controlled so uniformly that individual results are generally below 0.15 mg per liter and very rarely in excess of 0.20 mg per liter.

"With regard to blood levels, it may be said that mean blood lead concentrations as high as 0.07 mg per 100 grams of whole blood are compatible with complete health and well-being."

The New York State Division of Industrial Hygiene has adopted the standard for practical use in determining lead absorption in excess of the normal:

Urine: Lead in the urine in excess of 0.1 mg of lead per liter of urine indicates an excretion of lead above that which one would ordinarily expect to find in a normal individual.

Blood: Lead in whole blood in excess of 0.07 mg per 100 gm of blood may be regarded as higher than the normal.

In California, the Bureau of Adult Health, Division of Industrial Hygiene, stated in its *Occupational Health Bulletin* (No. 2, 1948), "Unexposed individuals excrete a small amount of lead in the urine normally, but figures of .15 milligrams or more of lead per liter of urine are practically always indicative of lead absorption. The analysis of the blood for lead gives invaluable information as to the general level of the lead exposure that has recently been experienced. Here again the sample must be taken with meticulous care to avoid contamination by either glassware, needle, or reagents. Results in excess of .07 milligrams per 100 grams of whole blood are indicative of lead exposure within some recent period; results in excess of .10 milligrams per 100 grams show that the exposure has been considerable."

It is apparent from the opinions quoted that one must carefully differentiate between mere absorption and intoxication. It is also apparent that the standard laboratory report forms are not realistic in their upper limits of normal for lead in urine or blood. The physician in practice must therefore take into consideration his own experience as well as the opinion of those he feels are authorities in lead intoxication. For a more detailed evaluation of the mean normal and abnormal findings of lead in the urine, blood, and feces the reader is referred to an excellent study by Kehoe.[1]

Treatment

MOST CASES of lead intoxication of the type previously described require no treatment other than to withdraw them from their exposure. Often they may continue working but should be assigned to a job free of lead. For the intestinal colic intravenous calcium gluconate is given at three- or four-hour intervals and for as long as the colic persists (10 cc of a 10% solution). The constipation is best relieved by magnesium sulfate, one-half ounce daily. For obstipation, in addition to the magnesium sulfate, an enema of Fleets Phosphate of Soda is effective. Iron combined with vitamins (orally) is prescribed for the anemia.

As for calcium EDTA, I have never had occasion to use it. Its efficacy in removing lead from the body appears unquestioned. Certainly its use in lead encephalitis in children is warranted, as it is in the exceptional industrial case. But I fear that the acclaim accorded it has made some of us "shot-happy." Its routine use is economically and possibly therapeutically unsound. It must be remembered that elimination by the physiological process of nature still exists and is adequate in all but the exceptional case.

Use of calcium EDTA as a preventive measure is indefensible, yet such a procedure is accepted by those who look upon it as a miracle drug. From the Department of Health of the City of Denver I received a letter which stated that "six

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cases of lead poisoning were discovered in a battery plant while in the process of investigating a complaint not directly related to the lead problem. When questioned the plant manager stated, 'we do not worry about lead poisoning now that we have Versenate' (calcium EDTA). His plant hygiene was what you would expect under the circumstances."

Control measures have been relaxed in several small plants in the Huntington Park area of Los Angeles County since they have employed an elderly physician to do periodic stippled cell counts. When he finds an increase the worker is placed on Versenate tablets and keeps on *working at the same job.*

Summary

THE literature describing plumbism is voluminous and dates back to antiquity. Each passing generation added to the picture observations which were often unscientific. The need today is to remove some of the daubs and dust this entity has collected. Our students and inexperienced physicians should be viewing a more realistic canvas than that which is presently held before their eyes. Certainly there will be those who will criticize the description of plumbism as given here on the basis that it has been oversimplified. It is so hoped, because disagreement will call attention to the unfounded obverse.

The observations made in this paper represent over 20 years' intimate experience with lead intoxication during which time there has been a marked transition in the industrial hygiene control of the exposure to lead and a more alert attitude on the part of management and the worker. All this has resulted in industrial plumbism being, with rare exceptions, a mild gastroenteric type.

(520 West Seventh Street.)

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Industrial Health and Workmen's Compensation

THE combined efforts of Dr. Peter J. Di Natale, chairman of the Council Committee on Industrial Health, and Dr. Gerald D. Dorman, chairman of the Council Committee on Workmen's Compensation, have resulted in a step forward in an effort to bring better health to the worker and a better understanding to the physician of the scope of industrial health. Industrial health is pointed to the determination of the causes and prevention of injuries and illnesses. Workmen's compensation is designed to take care of the halt and the ill after an injury has been sustained. For several years your State Medical Society has attempted to institute a Bureau of Industrial Health as part of its function. This goal has been reached recently in the appointment of Anthony A. Mira, M.D., as the Director of the combined bureaus of Industrial Health and Workmen's Compensation. Dr. Mira was formerly Medical Director of the Sun Chemical Corporation, Gimbel Brothers, and of the Department of Welfare of the City of New York. He brings to this work a wide experience in the field of industrial health, as well as a close and sympathetic relationship to the medical profession. Dr. David J. Kaliski, for nearly 25 years Director of the Bureau of Workmen's Compensation, is now retiring and will serve as consultant and adviser throughout this year. Your State Medical Society will now attempt to assume a place in the field of industrial and occupational medicine. An attempt will be made to have physicians and county medical societies participate more actively in the problems of medical care and also of preventive medicine and rehabilitation relating to the workers of our State. The functions of the Workmen's Compensation Bureau will continue, it is hoped, in the thoroughly competent and extremely well-conducted manner in which Dr. Kaliski served so long and so well. Increased education is necessary for all, the physician, management, and labor — by all means and media of publicity — in order to accomplish our goal in this field.

—Editorial, *New York State J. Med.*, 1562 (1957).

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Glaucoma Detection in Industry

MULTIPLE FIELD PATTERN TEST

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EARLY detection of glaucoma anywhere and everywhere is perhaps the most important responsibility of the medical profession (not only oculists) in the daily battle for sight conservation. Eye protection from work hazards, yes; modern techniques of emergency care of eye injuries in plants, yes; proper optical aids and illumination, yes — these are accepted truths. But the insidious pathological processes that accompany a rise of intraocular tension, destroy sight without warning and without sign — until too late. Pressure on the optic nerve kills the fragile fibers, starting in the periphery. Central vision usually remains perfect until just before the end — blindness. Once detected, one actually can hope only to halt further progress; rarely there can be any restoration of visual field or sight already lost.

Since preplacement and periodic physical examinations have become an accepted part of our constant effort to discover and correct disease, oculists have sought a technique by which to detect glaucoma, and detect it early as a part of the physical examination. Up to now there has been no way of doing this in industry or in large groups of the population — e.g., automobile drivers. To take tonometer readings in the plant is totally unsatisfactory as well as dangerous. Eyes have been lost by technicians anesthetizing them and using a tonometer as part of a so-called "multiphasic" series of tests. *Such tests should never be made.* Results obtained by any and all such procedures have been found valueless, or worse. They are inaccurate and misleading; and men and women become alarmed; and a person who once is made to think he might have glaucoma, can seldom be convinced otherwise. As worry and apprehension are one of the precipitating factors producing glaucoma, they must be avoided at all costs.

To date all instruments for making peripheral field tests in plants have been either too complicated, too time-consuming, or too inaccurate. Finally, however, a technique has been developed by Drs. Harrington and Flocks that does give us accurate findings, with simple fool-proof equipment and taking only a few minutes.[1,2] It will not uncover all people with glaucoma (nothing can ever do that, even in our offices), but it will uncover all those who are really being threatened. Early field changes are the warning bell, and, if found, give the patient and ophthalmology a chance to institute proper management.

We believe that if all applicants over 45 years old, and all employees over 45 in all industries, were given this simple test periodically (yearly) a large group (2-3% of the total population) of glaucoma cases, otherwise overlooked, would be uncovered. Cases with field defects referred to

Fig. 1.
Box containing patterns.

Fig. 2.
Source of black-light illumination, and cover over one eye.

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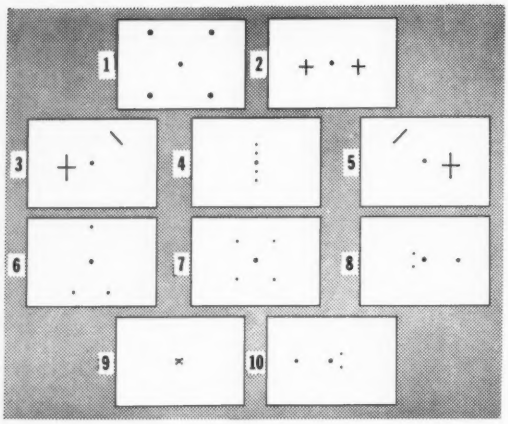

Fig. 3.
Gives 10 patterns in order of their exposure.

an ophthalmologist without "jumping the gun" on diagnosis (brain tumors also have field defects) could then be completely evaluated and taken care of.

The instrument Drs. Harrington and Flocks developed is already being used in many areas in industry; in large diagnostic clinics; and for Interstate Commerce bus- and truck-driver examinations. The author believes it a unique and valuable new tool for the industrial medical man. A field defect is detected, a diagnosis is not made, by the instrument. The case is referred to an opthalmologist for evaluation. There may be a time lag in the employee following through, and in some instances you may never know the end result. It does not matter (except academically); you have given your employee protection.

Work in Process

DR. T. F. MCGOUGH, Director of Public Health, City of Alexandria, Virginia, (personal communication, 3-7-57):

1. About 5% population in area will fail field test given in less than four minutes.
2. Five percent can be reduced to 2% by secondary screening same day.
3. *1955* — 2484 adults over 19 years screened: 45 had field defects = (1.81%) (only 10 under 50).
   1956 — 2576 adults screened: 38 had field defects = (1.08%) (only 10 under 50).

DR. LOGAN T. ROBERTSON, Medical Director, Occupational Health Service, Asheville, North Carolina, (3-11-57) reports:

2191 screened in North Carolina gave 115 cases (5% corrected figure).

5630 screened in Ohio gave 215 cases (4% corrected figure).

Dr. Robertson also came to the conclusion that in those with defects a second test done at once would reduce referrable cases to about 2%. This is in line with the percentage of glaucoma found in the general population.

DR. DONALD GLENN, Medical Director, Pennsylvania Railroad (3-5-57) reports, in beginning study:

1. Total 64 (53 over 50 years old).
2. Two found with field defects — cataract, optic atrophy.

Whether these cases would have been found by other techniques I do not know. Dr. Glenn is expecting to broaden his study.

DR. WINSTON ROBERTS, Diagnostic Clinic, Winston Salem, (communication, 3-7-57) reports a most significant picture:

1. Fifteen hundred routine screenings of people 35 years and over.
2. Thirty-one new cases of early glaucoma found with visual field defects.

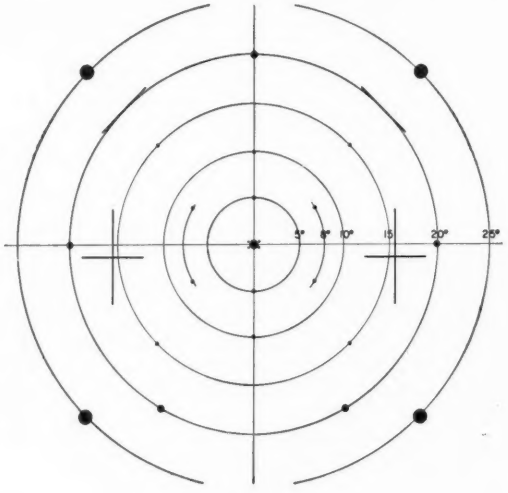

Fig. 4.
Composite of 10 patterns.

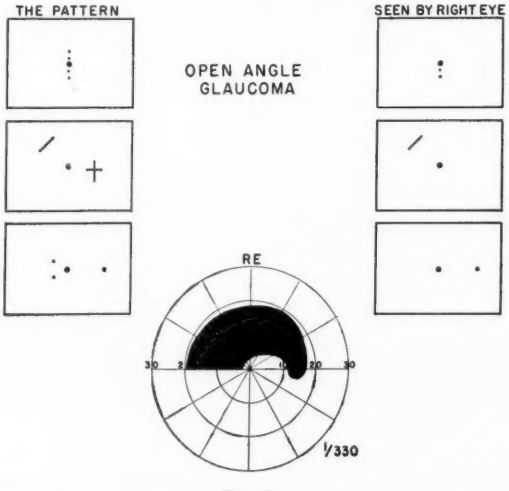

Fig. 5.
Case of open-angle glaucoma (right eye).

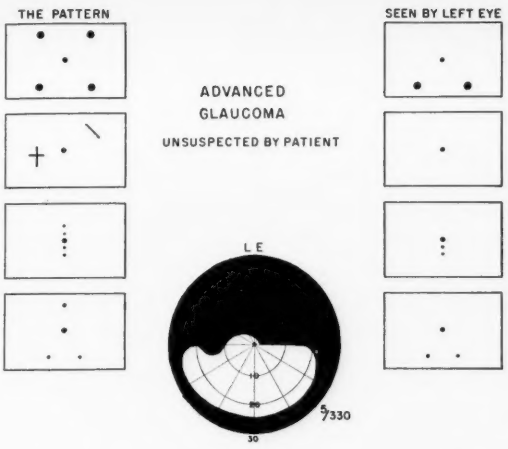

Fig. 6.
Case of advanced glaucoma left eye (unsuspected).

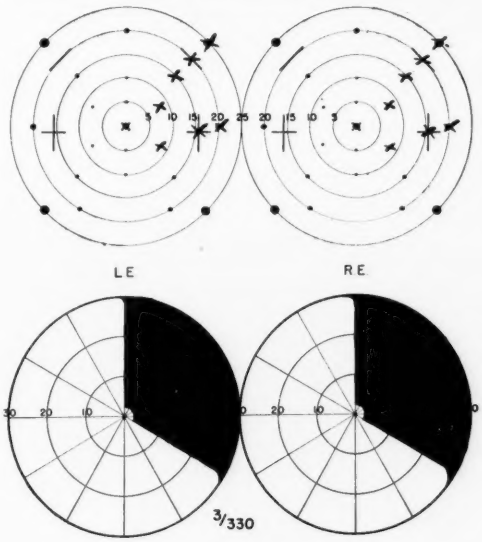

Fig. 7.
Composite chart and tangent screen record of visual field defect in meningioma of occipital lobe.

3. In addition, out of 67 previously known early cases (that were checked with screener) 39 had field changes.

4. Eighty to 85% of cases good correlation between screener and tangent screen.

5. Out of 1500 screened 133 were positive = (8.8%). Of these 93 (or 69%) had either glaucoma or pathology.

GLAUCOMA day study, Santa Barbara, NSPB reported (3-8-57) (Dr. Harrington):

Out of 192 visual field examinations (of total 670 people) there were 22 with abnormal fields who had a confirmatory glaucoma diagnosis = (11.4%). (This figure is high because the screener was used only on suspect cases, but it does indicate high rate of detection.)

DR. RALPH DANIELSON reports, as part of a large traffic study (3-6-57):

Out of 680 tested there were 53 field defects = (7.7%).

DR. T. J. SMITH, Standard Oil of Indiana (1-11-57): 3967 tests and three cases found with defects. Reason for this being explored — age brackets one factor.

There are areas of usefulness other than in industry per se to detect glaucoma early. There is a great opportunity in the field of safety for this simple test — such as during routine physical examinations of railroad operating men (constituting an unusually large proportion of older men); as part of the CAA pilot test in civil aviation; and its increasingly recognized use in tests given commercial and private automobile drivers. It is only recently that pilots (young in a young industry) have progressed into the 40-years-and-over category. Remember that lateral vision is now recognized as essential for safety on the highway.[3,4] Driver license eye tests, given both on application and at permit renewal time, should include visual field tests. The ICC already requires minimum lateral fields for bus and truck drivers crossing the country.

The Test

NOW FOR the test itself. It is simple. Standardized results are easily recorded and interpreted. The technician needs little training. The instrument ultilizes the principles of flash pre-

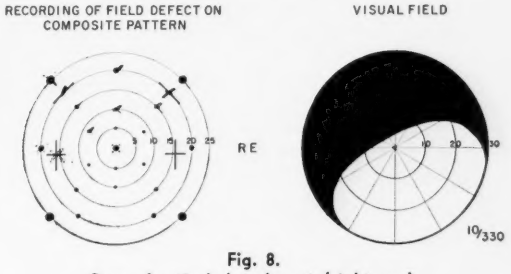

Fig. 8.
Case of retinal detachment (right eye).

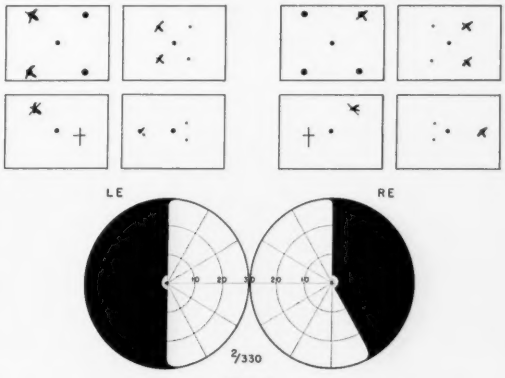

Fig. 9.
Case of pituitary adenoma (bilateral hemianopsia).

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sentation of simple abstract patterns of lines, dots, and crosses to the fixing eye. These patterns act as visual stimuli, and are printed in white fluorescent sulfide ink on white cards. When one begins the test only the black central fixation dot is visible. The card is then illuminated by a flash of ultraviolet radiation for ¼ sec. and a pattern stands out. The patient indicates what he has seen. Series of patterns have been devised so as to test the entire field, and errors are checked off on a chart. The illustrations (obtained from Dr. Harrington) demonstrate the procedure.

IN CONCLUSION, may I state that this very simple technique was presented for two main reasons. The first is to urge you to do your part in the battle of sight conservation by using this early glaucoma detection procedure. The second reason is to urge you *not* to do tonometer readings.

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HARRINGTON and FLOCKS: Multiple Pattern Method of Visual Field Examination. *Trans. Am. Acad. Ophthalmology & Otolaryngology*, (March, April) 1955.

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BRANDALEONE, HAROLD, *et al:* Recommendations for Medical Standards for Motor Vehicle Drivers. *Indust. Med. & Surg.*, (January) 1957.

The Multiple Pattern Sight Screener is manufactured by Jenkel-Davidson, 366 Post Street, San Francisco 19, California.

Profit in Sickness

THE WORLD in which we live has somehow gone cockeyed when a man can make a financial profit, at his employer's and government's expense, by staying home sick from his job. This is the net effect of Federal and state tax law, United States Supreme Court decision, and New York State administrative ruling. Briefly generalized, the end result is that the generous employer continues the employee's wage or salary while the worker is absent for illness; the employee excludes this pay while sick from his total gross income and pays no tax on it. If the employer were especially generous, the employee could stay away for a whole year and, under certain circumstances, live wholly tax free on income for which he had not done a stroke of work. He could even deduct his medical expenses from his legally nonexistent income . . . . When an employee is paid while absent for illness, he ordinarily suffers no loss except for medicines, doctor bills, or hospitalization. These costs are, if substantial enough, deductible as medical expenses. On the contrary, the employer suffers the loss of his employee's service, and may suffer the added cost of hiring a temporary replacement. The cost of continuing the regular employee's wage or salary and the possible wage to a replacement becomes part of the cost of doing business, and hence has a partly compensatory effect on the employer's tax return. But the cost to the employer is not complete. In fact, if government, Federal or state, is to recognize either party for the cost of employee illness justice would favor compensation to the employer rather than the employee. Instead the employee is now to get an unearned dividend for being ill. One of the curious sidelights of this matter is the fact that the more responsible, the more humane the employer, the more business-like he has been in making the employee secure in his expectation that his income will continue if he is ill, the more certain is the employee to get tax rebate. The less responsible employer, who continues pay on whim only or withholds it if he wishes in the absence of settled, written-down, announced policy, saves himself money. Meanwhile his employees, who suffer the greater hazards of uncertainty as to income while ill, would be treated less favorably also by government on taxation. This is one more inequity. We will not examine here the antecedents of health, welfare, disability and insurance law and policy that lend some color of logical sequence leading to the situation in which we now find ourselves. But the consequences are plain and, in our opinion, do not make for sound public policy. Federal tax law already puts fairly strict limitations on the financial reward to any beneficiary. On New York State taxes, however, the sky seems to be the limit. There is no waiting time to qualify; there is no ceiling on weekly income deductible. The door is opened to wide abuse, and those — of larger income — who least need this illogical subsidy are the ones in a position to profit most at the expense of other taxpayers. A year off for reasons of health, at government expense, is invited. It seems to us that there is work ahead for Congress, but more especially our New York Legislature.

—From an Editorial in *New York Times*, April 6, 1957.

XUM

Safety Measures to Minimize Auto Injuries

ROBERT W. CONNOR
Product Study Office, Engineering Staff
Ford Motor Company, Dearborn, Michigan

THE AUTOMOBILE has become an essential part of our contemporary society. None of us will discount the resulting benefits to our way of life, our economic progress, and our essential needs. However, there have been penalties as well as premiums involved, not the least of which have been automotive accidents and injuries. Unfortunately, there is considerable confusion regarding the automotive accident problem. Statistics clearly show that substantial improvements have been made in automotive safety. During the past quarter-century, in fact in just the last 20 years, the fatality rate per mile of traffic exposure has decreased 60%. And this accomplishment has been achieved even though the use of automotive transportation has far exceeded the provision of additional roads. It would appear logical to expect accidents to increase in proportion to vehicle use, and certainly, the increase in traffic on our streets and highways would seem to imply greater risk of accidents.

Fortunately, such has not been the case. Many agencies have operated to attain the continuous improvement in traffic safety. However, the problem is a most serious one, and solutions are diligently sought to reduce the economic loss and minimize human distress. A deliberate program has been necessary to attack this problem. Obviously, the most effective measure would be to find ways of eliminating automotive accidents. Realistically, we cannot expect complete success ever will be attained in this effort so long as we must deal with imperfect human behavior and driving circumstances, but this aspect of the problem should always receive priority. Since accidents always will occur to some degree, methods must be found to reduce the injuries they can inflict. Another line of attack, which can pay dividends immediately, is the better treatment of the injured. It is a surprising fact, in this respect, that over 85% of automotive accident deaths occur a matter of hours or days subsequent to the accident. Better first aid and emergency care have been recommended by medical experts as steps long overdue for ameliorating the automotive accident problem.

AN ANALYSIS of accident-reducing factors shows that there are two essential categories of control. Vehicle design improvements constitute the history of automotive technology progress. Vehicle stability and controllability have steadily improved. The field of driver vision has continually increased. Vibration and noise have been reduced for less driver fatigue. It is rare today for us to hear of an accident being caused by a vehicle component failure, and the inclusion of numerous courtesy features, such as stop lights, turn indicators and headlamp dimmers has improved our driving manners and better communicated our intentions to other operators on the road. Some other important accident prevention factors are beyond the control of the automotive designer. In this class is the necessity for adequate highway facilities together with safety education and driver training, both of which already have paid dividends in better safety. And of course, even the safest-designed highway requires traffic supervision to obtain the best driver behavior, and law enforcement is one of the most effective deterrents to faulty driving habits.

MOST of us are aware that during the last decade, vehicle performance has greatly improved. The better accelerating ability of modern cars provides greater clearance for maneuvering in today's highly congested traffic. During the same period the stopping ability of our cars also has improved, and thus greater clearance is provided for avoiding accidents. One design concept that recently has received greater attention is that the machine is an extension of the driver. Power steering is a good example of this type of human engineering. In such a system, the driver is used as the feed-back in a closed-loop servo mechanism, to function as the director and constantly to make corrections in the piloting of the vehicle along a chosen course. The skill of the design engineer primarily is directed towards

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providing a better, safer car, and the record clearly demonstrates that considerable success has rewarded his efforts in this direction.

The second aspect of vehicle design, the reduction of injuries received when accidents are not avoided, has demanded the assistance of workers in many fields. First of all, it was necessary to determine how people were hurt in automotive collisions. The mass data collected by researchers in this field established the relative degree of various vehicle areas as causes of injury. It was learned, for instance, that the steering mechanism inflicted serious injury to the driver. High-speed motion picture analysis and electronic instrumentation recorded the time-force history of such impacts. Through such research, a safety steering wheel was developed, which has proved highly successful in reducing driver injury during automotive collisions.

Similarly, it was learned that doors frequently flew open during accidents and spilled the car occupants onto the road. Such passengers were subjected to double jeopardy, one accident within the car and a second impact when they struck the road. The statistics showed that the possibilities of receiving a moderate-to-fatal grade injury were more than twice as great when ejected from the car, and the chances of being killed were more than five times as likely. A safety door latch was designed through research and development, and has greatly reduced the possibility of being thrown from the car during a collision.

Anthropomorphic dummies, which have the same size, weight and weight distribution as humans and are fully articulated to respond in human-like movements, were used in actual full-scale crash studies. Motion picture records showed the kinematics of these simulated occupants during vehicle collisions. Time-force records again were compiled, and the need for treatment of the instrument panel was established. Various shapes of panels and different types of padding materials were investigated in the laboratory and rechecked in full-scale crashes with dummy occupants. Medical schools also assisted in determining the human tolerance to impact forces.

Out of such research was developed an instrument panel padding treatment that distributes the force when struck by a car occupant, absorbs the energy of the impact, and prevents localized, sharp-metal contacts which are so destructive to soft tissue. The same material also was used to cover the sun visors above the windshield and protect the occupants' heads from striking hard metal.

The seat belt was studied along with other methods of restraint. It was found that the seat belt provided a high level of protection when properly designed and installed. In addition, the seat belt could be conveniently worn, caused little or no inconvenience, and actually, in many cases, improved the seating posture and over-all comfort of the occupants. In connection with this problem, special features were incorporated into the design of the seat to reduce the possibility of the seat running off the track during an accident and thereby forcing the occupants into the instrument panel and steering wheel.

RESEARCH and development continue in this search for safer automotive designs. Statistical evidence now available clearly proves the effectiveness of the design features already made available in production. Better highway facilities, training, and enforcement promise to contribute their share towards improved transportation safety. The medical profession has shown great progress in the treatment of the injured, and our steadily increasing knowledge of human behavior, tolerances and education will still further reduce the likelihood of accidents and minimize the possibility of injury.

In Terms of Service

TOO MANY industrial concerns still have little idea of what to expect from their medical adviser or what he may expect from them. There are those who think they can hire a physician as they would an unskilled laborer — the employer specifying the wage to be paid and the work to be done. A physician accepting even part-time employment under these conditions is foolish. This situation will be remedied in time, as we hear more and more captains of industry express themselves as did Mr. H. W. Anderson, Vice President of General Motors, at a recent meeting: "The evolution and development of our own health maintenance program is in itself a tribute to the fine work performed by our staff of some 160 physicians. They have established themselves and the importance of their function through the countless evidences they have provided in terms of service to employees and in the value of their counsel to management."

—From "Industry Calling! Is There a Doctor in the House?" by W. P. SHEPARD, M.D., in *California Medicine*, November, 1956.

XUM

Health Hazards Associated with Unsymmetrical Dimethylhydrazine

BURTON S. SHOOK, SR., M.D., and O. HIRAM COWART, Lt. Col., M.C.
Redstone Arsenal, Alabama

THE ROCKET was invented in the Orient. History records the use of rockets as weapons of war several centuries before the birth of Christ. This principle of warfare spread westward, and use of the rocket began in Europe. With the development of the cannon, interest in rockets declined and the rocket was not reintroduced until 1805, when Sir William Congreve of England became interested and started a rocket program in that country. During the War of 1812, the British used rockets against United States forces defending the Capital at the Battle of Bladensburg (1814) at Fort McHenry; this inspired Francis Scott Key to write of "the rockets' red glare" in our National Anthem.

The United States instituted rocket research and development in 1846, but around 1850 interest in this field again lapsed. In 1916 Dr. R. H. Goddard, the father of modern rocketry, aroused the Army's activities in development of military rockets. After World War I, working under a Smithsonian Institute grant in 1920, Dr. Goddard is credited with developing many of the basic concepts in rocket and jet propulsion engineering. Thus the United States, contrary to popular belief, actually was the first to create the modern principles that were applied to guided missile development.[1] During World War II, several types of rockets (bazooka, JATO) were successfully used by our Army.

The history of rocket and guided missile evolution since World War II is familiar, since so much emphasis has been placed upon this important phase of research and development. Scientists today are carrying on research, with the objective of carrying missiles to greater distances.

With this increased emphasis on missile and rocket research, literally dozens of industries all over this country have been asked to develop and produce the various components that make the completed missile. One of the most important of these components, naturally, is the fuel that creates the propelling force to carry a missile to its destination. It is one of these fuels, unsymmetrical dimethylhydrazine (UDMH), that is the topic of present consideration.

If UDMH were suited only for use as a rocket propellant, further studies into its properties and its actions on the human being, and the medical reporting of these studies, would be warranted at this time. But the need for further study is accentuated by other developments in improved fuels for certain rocket engines already developed,[2] and recent experimental tests have indicated the possible uses of UDMH as an intermediate in such fields as pharmaceuticals, agriculture, rubber, and plastics.[3] Already, medical research with animals has revealed that UDMH is a toxic material. It possesses qualities that may produce pulmonary irritation, delayed gastrointestinal irritation,[4,5] hemolysis, convulsions, and death. Hodge reports that when applied to the skin of a rabbit, doses of 0.2 cc/kg or more produce death, and that six of six rats were killed by inhaling the vapors of UDMH.[4]

By analogy, early workers concluded that UDMH may produce chronic or cumulative effects and cause damage to the liver and kidneys. More recent experimental work has failed to confirm all these conclusions, yet the possibility of such effects on the human cannot be eliminated.

The accumulated data revealing the toxicity of UDMH following human usage have been limited in quantity. Since actual experience with UDMH and the human has thus far been limited, every effort is being made by medical and safety personnel to prevent any contact with the material, on the assumption that it has toxic potentialities.

Acute Toxicity

ACCIDENTAL spillage has confirmed that UDMH produces pulmonary and gastrointestinal irritation in humans. Sigurdsson[6] stated that two workers, 750 yards from the source of fumes, experienced initial choking and difficulty in breathing; four hours later both men became extremely nauseated, finally vomited their meals almost completely undigested, and were left with the odor and taste of UDMH in their mouths.

Presented at the Annual Meeting of the Association of Ordnance Industry Physicians, St. Louis, April 27, 1957.

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SUMMARY OF MEDICAL EXAMINATIONS

PHASE I

APPROVED: O. Hearn Courart
POST SURGEON - REDSTONE ARSENAL
DATE: 18 OCTOBER 1956
PREPARED BY BURTON S. SHOOK, M.D.

OCCUPATION	HAZARDS	TIME INTERVAL	M.D. EXAM	CLIN. PSYCHOL.	X-RAY CHEST	BLOOD EXAMS: RBC-HBG	BLOOD EXAMS: WBC-DIFF	BLOOD EXAMS: SEROLOGY	BLOOD EXAMS: HEMIT SED RATE STIPPLING (COUNT)	URINE EXAM: COMPLETE	URINE EXAM: SUGAR-ALB	URINE EXAM: QUAL. BILE	URINE EXAM: COPROPHYRINS	URINE EXAM: THYMOL TURB	LIVER FUNCTION: CEPH FLOC	LIVER FUNCTION: BLOOD	LEAD: URINE	LEAD: EKG	AUDIOGRAM	VISUAL SCREENING (KEYSTONE)	SPECIAL REMARKS
PRE-PLACEMENT EXAMINATION		INITIAL (REQUIRED AFTER EVERY SEPARATION & REHIRE	X	X	X	X		X			X											WHEN JOB DESCRIPTION INDICATES SUCH, PHYSICIAN WILL PERFORM OTHER TESTS AS INDICATED
ROUTINE PERIODIC EXAMINATION		AS SCHEDULED FROM CIVILIAN PERSONNEL	X		X	X		X			X											X-RAY NOT REQUIRED, IF PERFORMED WITHIN PAST 12 MOS. UNLESS ORDERED BY PHYSICIAN
UDMH-U-DETA EXAMINATIONS		INITIAL EXAM & EVERY 6 MONTHS	X		X	X	X			X		X		X	X							SPECIAL EXAMINATION AS SUGGESTED BY PHYSICIAN AS MAY BE INDICATED AT VARYING INTERVALS
		EVERY 2 WKS.				X	X			X		X										
BODY REPAIRMEN (TRANS.), BATTERY MAKERS, FOUNDRY WORKERS, LEAD BURNERS, PLUMBERS, BRUSH & SPRAY PAINTERS, WELDERS, ELECTRONIC EQUIPMENT INSTALLERS & REPAIRMEN	LEAD	INITIAL EXAM.	X		X	X	X		X	X		X				WHEN INDICATED ON MARKED EXPOSURES AND WHEN INDICATED BY POSITIVE PORPHYRIN		ALL PERS OVER 45 YRS				CONSIDER X-RAY OF LONG BONES, HEMATOCRIT WHEN ANEMIA APPEARS
		3 MOS.	X		6 MOS	X	X		X	X		X										ORAL EXAMINATION
PAINTERS, ALL REPRO PERSONNEL, ALL DEGREASERS, SHOE REPAIR, CHEM. LAB	ORGANIC SOLVENTS	1 YEAR (MAX.)	X		X	X	X			X		X			X			ALL PERS OVER 45 YRS				
INSECT & RODENT CONTROL PERSONNEL	INSECTICIDES RODENTICIDES HERBICIDES VARIOUS OTHER CHEMICAL POISONS	INITIAL EXAM.	X		X	X	X		X	X	X		X		X	X			X			
		3 MOS.	X			X	X				X											
HANDLERS OF ALL TYPES OF RADIATIONS (RESEARCH, MEDICAL, DENTAL & IND. X-RAY PERSONNEL)	RADIATION OVER EXPOSURE	6 MOS.	SURVEILLANCE IS PERFORMED BY SAFETY OFFICE - OVER EXPOSURE REPORTED TO MEDICAL DIV. MEDICAL EXAMINATION IS DESIGNED FOR INDIVIDUAL BY MED DR ASSIGNED FOR THIS PURPOSE			X	X															
ELECTRO PLATERS, METAL SURFACE TREATMENT & DIP TANK PERSONNEL	CHROMATES CYANIDES ACIDS & ALKALIS ORGANIC SOLVENTS CADMIUM VANADIUM VARIOUS OTHER TOXICS	9 MOS.	X		X	X	X			X		X										
CHEMICAL LAB PERSONNEL (INCLUDING WATER & SEWAGE TREAT) ALL WORKERS IN EACH CHEMICAL LAB	MERCURY ORGANIC SOLVENTS ACIDS ALKALIS VANADIUM VARIOUS OTHER TOXICS	6 MOS. TO 1 YR.	X		X	X	X			X	X	X										
PROFESSIONAL & ADMINISTRATORS		1 YR.																				
JANITORS		15 MOS																				
DEMOLITION PERSONNEL	FUELS, PROPELLANTS, TETRYL, TNT, BENZOL, VARIOUS TOXICS & CHEMICAL POISONS	INITIAL EXAM.	X		X	X	X		X		X				X	X						
TRANSPORTERS		3 MOS.	EVERY OTHER VISIT			X	X				X											
ALL BULK FUEL HANDLERS & STORAGE PERSONNEL (EXCLUDING UDMH & U-DETA)	LEAD, FUELS, PROPELLANTS, VARIOUS TYPES OF HYDRO CARBONS, SOLVENTS, VARIOUS OTHER TOXICS	INITIAL EXAM.	X		X	X	X			X		X	X	X	X							
		1 YR. TO 18 MOS	X		X	X	X			X			X									
INSULATORS, SAND BLASTERS, MACHINERS OF FIBER GLASS, CEMENT WORKERS	SILICA, ET AL, RESEARCH IN PNEUMONICOSES, SILICOSIS, ASBESTOSIS, SIDEROSIS	6 MOS.	X		X	X	X				X											PULMONARY FUNCTION STUDIES MAY BE INDICATED
REFRIGERATION & AIR CONDITIONING PERSONNEL	FREON & OTHER GASES, METHYL CHLORIDE	1 YR.	X		X	X	X			X				X	X			X				
VEHICLE, FORKLIFT & CRANE OPERATORS	CHANGES IN VISUAL CHARACTERISTICS	1 YR.	X		X	X					X								X	X		
MISSILE FUEL HANDLERS (EXCLUDING UDMH & U-DETA	RED & WHITE FUMING NITRIC ACID (AFTER INITIAL EXAM)	3 MOS.	X		X	X	X															EVIDENCE OF RESPIRATORY INFECTIONS
	ANILINE, ZYLIDINE, (AFTER INITIAL EXAM)	1 MO.	X				X			EVERY 3 MOS.												METHEMOGLOBIN EXAM. EVERY MONTH

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A second accidental exposure led to similar results.

Through strict periodic physical examinations evidence from two separate sources[6,7] has been accumulated that confirms the probability of hemolysis. No previous records of evidence of cumulative effects have been found.

At this arsenal a program of medical surveillance for the human was devised to determine the extent of cumulative damage. Prior to entrance into exposure, complete physical examinations, including x-ray of chest, CBC, hematocrit, complete urine analysis including qualitative bile, cephalin flocculation and thymol turbidity tests, were performed and recorded as base line data. Those with occupational and personal medical histories of past injurious exposures, or with physical defects of significance were excluded as handlers of UDMH. Every two weeks the laboratory examinations as listed above, with the exception of x-ray and liver function tests, were repeated. It was felt that total periodic checks should be made every six months after initial exposure, and all known persons subjected to exposure, no matter how trivial the degree, were asked to report for medical inquiry. Informational orientation programs were presented by medical, safety, and chemical scientists, and all questions asked were then answered in the light of the known information.

In a chemical laboratory, where the exposure had been under control, where all material had been stored in operating hoods in sealed containers; where protective equipment was devised, approved, and provided; and where adequate orientation of scientific technicians was secured; SOP's established, and supervisors acutely aware of situation, intermittent exposures to small laboratory quantities still occurred throughout each working day, six days per week (10-hour working days) for approximately three months. During the next three months the exposures were less intermittent (probably six to eight exposures with a total of two to four hours per week at most) under the same controlled conditions.

Five chemists, engineers, or technicians were under close medical surveillance during the interim. Because of medical laboratory evaluation, but without clinical symptoms or signs, a subclinical acute toxicity was observed in one worker. He was removed from exposure and the person who replaced him showed this same trend in four weeks. Since both of the others were temporarily removed, person No. 3 began to perform the same duties, and evinced the same trend in 10 weeks. What had previously been set as a pathognomonic sign of toxicity, i.e., an elevation of WBC above 12,500 without clinical evidence of infection or hemoconcentration, was observed. This individual likewise was removed from exposure. The two who previously had been temporarily removed from exposure, had then returned to work but under much reduced exposure.

Chronic Toxicity

AT THE end of six months, re-examination of these five individuals revealed no clinical evidence of toxicity by physical examination. However, five of five had a positive cephalin flocculation; one 4 plus, one 3 plus, and the others 1 or 2 plus reactions. Normally, our estimate of 1 and 2 plus reactions would be as insignificant or equivocal, but 3 and 4 plus reactions certainly provoked some concern. A repeat cephalin flocculation test was done four days later to rule out the possibility of laboratory error, but followed closely the previous findings. All were positive. Other changes during the observation period were insignificant.

In a second group, storers and handlers, six men were examined prior to exposure. Shortly, three of these six became dissatisfied with medical activities and voluntarily dropped out of the program. During a six-month period, this group of individuals had three to four days' outdoor exposure while transferring the material from 55-gallon drums in tank car loads to permanent storage, then no exposure for several weeks. About mid-period, while transferring some material, an accidental spillage occurred. No acute signs of toxicity were produced, since proper precautions and control measures were used. These men worked outside in concentrations sufficient to produce an odor during the decontamination process, which lasted three to four days. Since that time, this group has required surveillance only as to the stored material. During this six-month period, one person presented a laboratory finding of abnormal RBC, WBC and casts in the urine, but related no previous history of urinary trouble. He was removed from exposure but returned to normal in four weeks and was permitted to return to work with his group. The three who continued under medical care also showed 1 plus reactions to cephalin flocculation with no clinical symptoms or signs. Recently the three who discontinued medical supervision have been re-examined. One showed a 3 plus cephalin flocculation and had 3.2 units thymol turbidity; one a 2 plus; and one a 1 plus reaction.

Control

ALTHOUGH efforts are being made to develop adequate detection equipment for protection of handlers of the material,[8] none is available at present.

Since indications are that UDMH may produce pulmonary irritation, delayed gastrointestinal irritation, hemolysis, convulsions and death, close medical scrutiny of all persons exposed to it is mandatory.

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By education of personnel in proper handling and usage of UDMH and consequent application of this knowledge, we may eliminate the possibility of gaining human experience of the convulsant action and of the mechanism of producing death. Even with the proper handling and usage of the material, we must continue to maintain close control in the form of frequent periodic medical examinations in order to detect organic changes in the earliest stages.

Summary

THE ACUTE toxic effects of UDMH upon humans have been reviewed. A program of medical control has been outlined, with resulting evaluation. Even though the results may not be in statistically adequate numbers, 11 of 11 individuals showing questionable evidences of hepatocellular changes, by laboratory methods alone, indicate that further evaluation and reporting of human experience are warranted.

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The Concept of Integrated Medicine

CAPTAINS of industry are realizing, slowly but surely, the significance of the human element in the production scene, and the need of preventive and constructive medicine to harness it for fulfilling industry's social and moral obligations to society. But preventive medicine is much more than sanitation and immunization. While infectious diseases are decreasing, degenerative diseases and affections of the nervous system and of the mind are on the increase, and preventive medicine has to widen its scope to include prevention of disability through a case-finding program to detect disease in its early stage and undertake treatment. In its ultimate analysis however preventive medicine merges into constructive medicine whose basic principle is the best possible adjustment of the total person to the total environment. The total person would include the physical, mental, social and spiritual aspects of life, and the total environment should not be limited to microbes, natural or man-made environment and so on, but should also include people, their emotions and their human needs. Such an adjustment is a matter of each individual's personal effort to understand his own objectives, limitations and goals as prerequisite to understand those of others. Medicine can guide him toward such understanding by developing his mental health. Today's challenge of the atomic age to the medicine of tomorrow is mental health that can enable people to face with equanimity the increasing stress and strain of life. According to Wade if the physician is to accept this challenge he has not only to be a good clinician but has also to interest himself in psychology, social pathology, human relations, industrial hygiene, human engineering, sanitary engineering and safety engineering. This is the backbone of the concept of integrated medicine which is today being successfully exemplified by industrial medicine.

—From the "Sir Ardeshir Dalal Memorial Lecture, 1957," by DR. H. P. DASTUR, Chief Industrial Health Officer, Tata Industries Private Ltd., Bombay, India.

Examination of the Patient with an Industrial Dermatosis

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NO OCCUPATION is without its hazards to physical health. Brokers have neurodermatitis, floor walkers and traffic police have fallen arches and varicose veins, housemaids have bursitis, bartenders and countergirls have detergent dermatitis or monilial intertrigo. Diseases due to occupational pursuits are as old as history. In more recent times changing manufacturing processes have unfortunately complicated industrial disease to such degree that in many instances it is often difficult to determine its actual pathogenesis.

In our clinical approach to any dermatosis it is customary and advisable to make our initial examination objective in nature, studying both the healthy and the diseased skin. Then, ever aware of the old Viennese maxim, "Whatever the patient says is usually wrong," it is customary to take a detailed history, correlating the patient's story with what we have seen and inferred from our objective examination.

In a dermatosis, especially one suspected to be of industrial origin, it is essential that the medical history be complete, correct, and comprehensive. The patient's history is an important link in our chain of evidence establishing the cause of disability. And it is incumbent upon the medical attendant to submit an intelligent opinion on the question of industrial responsibility, since this decision may determine who pays for the patient's treatment, his compensation, methods necessary to prevent recurrences, and in some cases necessary procedures for the protection of fellow-workers. One of the greatest difficulties in evaluation of compensation cases is failure of the physician to get an accurate history as to exposure to environmental irritants, at home or elsewhere; or the sequence as to the appearance of the eruption, remissions and exacerbations, when at work, when on vacation, and pre-existing illness or disease.

The workmen's compensation law specifies that a physician shall render an opinion on the basis of "reasonable certainty." You know, as well as I do, that in the field of dermatology "certainty," in a scientific sense, does not exist. The physician must, therefore, render an opinion on a plausible, reasonable, and probable level. This does not mean an opinion based on quotations from textbooks or experimental literature, but rather on what he, himself, thinks from the information he has obtained from the patient, plus the sum total of all the information he has acquired during his years of experience.

The determination of the cause of a dermatosis in any given instance often depends upon persuading the patient to describe in his own words exactly what he does and what materials he handles. This is not as simple as it may seem. Downing[1] recommends that two separate histories be secured; one by the dermatologist's assistant, and, after a brief interval, during which the patient has had opportunity to reflect on his plight, a second history by the dermatologist himself. The two histories should then be compared, and discrepancies checked.

To facilitate a more comprehensive history it is advantageous to have available a standard questionnaire, preferably typed and kept before the interrogator during the examination. A questionnaire such as the following serves the purpose.[2]

A. Past History:
   1. Occupation and specific type of work.
   2. Previous eruption:
      (a) Its cause, nature, location, duration, and treatment.
      (b) Recurrences.
      (c) Its occupational relationship.
   3. Previous occupation (dates).
   4. Previous compensation claim (dates).

B. Present History:
   1. Duration of employment with assured.
   2. Duration of employment at specific job when eruption appeared:
      (a) Previous specific jobs.
      (b) Subsequent specific jobs (since eruption appeared).
   3. Work claimant is doing now.

C. Type of work:
   1. Routine and contactants.
   2. Demonstration of routine activity.
   3. Methods of cleansing and frequency.
   4. Clothing worn and changes.
   5. Personal protective measures (gloves, etc.).

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D. Onset of Eruption:
   1. Previous condition of skin.
   2. Onset, date, location, spread, effect of additional exposures; subjective symptoms.
   3. *Date* of *stopping* work.
   4. Time interval between starting specific work and appearance of eruption.
   5. Effect of avoiding contactants, vacations, week ends, etc.
   6. Effect of resumption of specific work.

E. Number of Other Employees doing Identical Work:
   1. Number of those similarly affected.

F. Treatment:
   1. Self treatment (what, when, where, and how long).
   2. Plant treatment (what, when, and how long).
   3. Effects of treatment.
   4. Report to foreman or supervisor.
   5. Treatment by physicians:
      (a) Names and addresses.
      (b) Date of first treatment, frequency, last treatment.
      (c) Type of treatment (topical, internal, radiation, etc.).
      (d) Diagnosis, patch tests, etc.
      (e) Results.

G. Own Interpretation of Cause.

H. Nonoccupational Contactants:
   1. Hobbies, sports, personal hygiene (hair tonics, soaps, shaving lotions, cosmetics, etc.).
   2. Dishwashing, gardening, cleaning, painting, car washing, etc.

I. Time Lost from Work.

Dates are important. Dates by "months" are usually accurate, but the claimant may not recall the *exact* day of an event. "About six months ago" turns out to be not February, but April if it is correlated to Easter or the Passover. Dates are not hard to remember when checked with other circumstances such as changes in residence, birthdays, holidays, weather, snow on the ground, vacations, etc.

Experience is necessary in questioning a patient to eliminate the unnecessary, and pursue further investigation of the significant features. One must also be able to recognize inconsistencies, falsifications, and malingering. Some patients, because of poor memory or simple ignorance, unintentionally give false or misleading information.

It is not the function of the examining consultant himself to confirm dates, or verify treatments by various physicians and hospitals. That is the duty of the carrier's investigator. Sometimes they too are remiss.

In this regard I recall the case of a man who was hospitalized for an industrial accident requiring a herniorraphy. He claimed that two days after the operation he developed a dermatitis due to topical preoperational antisepsis; that this was treated at the hospital and subsequently by his private physician. He was not seen by the dermatological consultant until a year had elapsed. At that time there was a lichenified dermatitis of the scrotum and adjacent skin, including the gluteal folds, sacral region, and both calves. The consultant submitted a diagnosis of neurodermatitis, no industrial relationship. The case was continued as industrially related for three more years. At that time the carrier investigated the hospital records and early history of the case. It was discovered that no mention was made on the hospital progress chart, nor was there any discharge note of any dermatitis. The wound healed uneventfully, and, on examination, the physician for the State Compensation Board noted, two months after discharge: "A normal recovery and normal operative scar." It was also discovered that the patient subsequently was in two hospitals for involutional melancholia and chronic alcoholism, and only in the second was there mention of the dermatitis. This was a well-conceived and almost successful attempt by a patient and physician to defraud the carrier and possibly obtain permanent total disability.

IN INDUSTRIAL dermatology there are three basic types of malingerer: First, there is the individual who, at the time of his employment, conceals some dermatosis. The aftermath of this is a subsequent claim for compensation. Secondly, we have the worker, well-informed regarding contact dermatitis and compensation law, who intentionally, by means of alkalies or degreasers, provokes a contact dermatitis of his hands. Lastly, we have the legitimate compensation patient who, by one means or another, intentionally delays his recovery. Unfortunately, in some instances the attending physician may be an unintentional accessory.

The most common systemic dermatoses concealed at the time of employment are atopic dermatitis, psoriasis, and seborrheic dermatitis. These are periodic or seasonal in nature, so that on the occasion of the pre-employment physical examination there may be no visible evidence of their existence. I recall dozens of cases in which industry is paying for treatment of patients with one or another of these three dermatoses. There are also cases of chronic exudative and lichenoid discoid dermatosis considered compensable. In New York the Commission recognizes atopic dermatitis, psoriasis, and many other systemic dermatoses as of industrial origin, if they develop as a consequence of, or are continuous with, a contact dermatitis.

I can report one typical case of chronic exudative discoid lichenoid dermatosis originating in New York in which the claimant was granted all expenses for three winters in El Paso, Texas,

during which time his skin recovered completely, only to erupt again on his returning home. He did not work for five years, and was finally given a lump sum settlement. Here was an instance in which the dermatosis bore no relationship to the patient's occupation.

Crude methods of traumatizing the skin by means of friction and chemicals, cigarette burns, lye, mustard, hot metal, salt burns, etc., should be immediately recognized as such by the examiner. Fortunately this type of lesion is rare in workers; I recall only four in many thousands of cases of industrial dermatoses. They naturally should be expected during hard times when unemployment indices are high.

Self-inflicted injuries have certain basic characteristics as follows:

1. The lesions are usually located in easily accessible areas, are often unilateral; on the left side of the body in the right-handed individual, and vice versa. Seldom are the face or genitals sites of self-inflicted injuries.

2. The lesions tend to be angulate, bizarre, and geometric in configuration; not conforming to any dermatopathy.

3. The most common type is the black, ulcerative, or erosive eschar, but occasionally ecchymoses and bullae are seen.

4. When produced by acids or alkalies, evidence of their having run down in streaks or having been spilled may be present. Also the finger tips may be stained.

5. Exaggeration of subjective symptoms.

The third type of malingering is difficult to classify. It includes several types of dissimulation. There is the worker who, having recently recovered from a contact dermatitis due to his work, uses soap and water to cleanse his skin to convince himself that he can tolerate them. There is also the housewife who must take care of her family, clean, prepare food, and wash dishes in addition to her job at the "factory." Probably she could take care of her job alone without difficulty, but the added household duties are too much, and as a result she has a contact dermatitis. Then there is the girl who, before marriage, suffered from a mild contact dermatitis of her hands, attributed to her employment as a waitress, which did not require her stopping work, and who, after marriage, in order to enhance the family funds, stops work, goes on compensation, and convinces the referee or compensation court that her dermatitis is due to her employment rather than her household duties.

After a case has been accepted as compensable and payments are made by the carrier, it is next to impossible to have it adjudged otherwise, no matter how long it continues. At subsequent hearings, all the referee is interested in is the degree of disability of the claimant, and if he is working. He is not interested in whether the original claim of industrial relationship is valid, and whether the claimant is intentionally and deliberately prolonging his disability by fraudulent means. The only recourse available to the carrier is a lump sum settlement, acceptable to the claimant (and his attorney, who probably gets the lion's share).

Recently I had occasion to examine a claimant several times for an alleged cement dermatitis. A few days before each examination, his physician would apply a patch test of 2% sodium dichromate which would give rise to a generalized dermatitis for my benefit, although for months the patient had been free of any eruption.

However, every occasion in which a patient does not recover regardless of whether he is working, is not malingering. Morris[3] has listed 24 reasons why the worker's skin does not clear up. Most significant among these are the following:

1. Failure, sometimes deliberate, to follow his physician's advice.

2. Overtreatment or injudicious treatment.

3. The patient, by continued exposure to a substance fails to establish an immunity to it, but actually gets worse even while under treatment.

4. Bacterial infection may be responsible for prolonging the period of disability.

5. Dermatophytosis and remote bacterial infections may coexist so that the contact dermatitis may pathogenetically be a dermophytid or bacterid.

6. Extraoccupational exposures are responsible in many cases. Even inappreciable contact to specific substances may be responsible. This is especially true of nickel, chrome, and rubber dermatitis. Chrome dermatitis of the hands may be perpetuated by the wearing of chrome tanned shoes; and rubber dermatitis may be perpetuated by the wearing of elastic arm bands, garters, dress shields, and rubber "sneakers." I recall one instance in which the carrying of a vulcanized rubber-handled umbrella caused a flare of dermatitis of the hands due to rubber gloves which had been quiescent for over a year.

7. Emotional and nervous disturbances.

8. An allergic background, atopic dermatitis.

THIS BRINGS us to the problem of allergy. Few concepts in medicine are more controversial. If for no other reason, a comprehensive examination of the claimant is necessary to establish or disprove allergy to industrial contactants as responsible for a dermatosis. The incidence of dermatitis due to environmental irritants is much greater than in ordinary life. Both government and industry are trying to replace many sensitizing substances and substitute nonsensitizing materials in various manufacturing processes.

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From the standpoint of the insurance carrier it is vital that a difference be established in each individual case between primary irritation as the cause of a dermatitis and allergic sensitization. For example, let us assume that our patient is a lithographer. He has worked for employer "A" for several years and has developed an allergic sensitivity to potassium dichromate for which he has been treated and has received compensation. Upon recovery several months later, he begins working for employer "B," also as a lithographer, his life work. Within a few days the dermatitis recurs. He is again disabled, is again treated, and again receives compensation. But in this case the carrier of employer "A" must share with that of employer "B" in defraying the expense of compensation and treatment of the claimant. This situation may carry on for many years; and if our claimant develops chrome dermatitis from shoe-leather adhesives, the carriers may have an incurable case on their hands which may be settled only by a lump sum payment.

The skin may be traumatized nonspecifically by exposure to various fluids, oils, greases, organic and inorganic solvents, vapors, dusts, etc. These materials may act as primary irritants or degreasers, and may cause all degrees of change in the skin from simple dryness with chapping to ulceration. Such dermal reactions must be differentiated from those mediated by an immunologic mechanism. It must also be appreciated that a nonspecific dermatitis may be aggravated and prolonged by a superimposed sensitization due to contact with *other* substances to which the worker has been exposed in his daily living habits and household duties; or even through the application of local medications intended to correct the original dermatitis. All these facts can and should be elicited by means of a good history.

The influence of the atopic mechanism in allergic contact dermatitis is rather obscure. Most allergists agree with Schwartz that a personal or family history of atopy, asthma, hay fever or eczema does not influence, to any degree, sensitivity to allergizing industrial substances. Rather, in my experience I have found this type of individual more susceptible to nonspecific *primary* irritation. This may be due to dryness of the skin or the relative inability of most atopics to perspire freely.

In taking the history of the claimant, it is therefore important to determine whether evidence suggests primary irritation or whether it suggests allergization. One should ask specifically regarding previous employment, its nature, and previous eruptions and compensation claims. The claimant should also be questioned as to how long he has been employed by the assured, how long at his specific job, and especially regarding occupational procedures and materials contacted, old and new (including detergents). If he develops a dermatitis after only a few hours or days of repeated contact he has had either a previous sensitization, or the responsible contactant is causing primary irritation. The length of this period of exposure and its frequency from an historic standpoint are manifestly significant. If exposure has lasted over seven days, it suggests acquired allergic sensitization to some material handled during that time. This incubation period of allergy varies in length with different individuals and substances, and actually represents the time required for development of the so-called "spontaneous flare reaction" in an individual previously nonsensitized to an antigen; or, in other words, it is the culmination of those immunologic processes stimulated by initial exposure. Experimentally this incubation period has been found to be between seven and 24 days, but may be much longer. With multiple exposures at regular or irregular intervals, this incubation period of allergy may be indefinitely long, as sometimes in the sequence of events, on the occasion of one exposure this period of sensitization to a particular substance has its inception.

Once this state of hyperergy is established, the usual incubation period is no longer necessary, as a suitable contact with the offending substance will be followed in a few hours by a cutaneous eruption. This is called "reaction time," and must be distinguished from "incubation time." The patch test is the method usually employed to determine this "reaction time," and confirms the existence of hyperergy to a particular substance. Reaction occurs within a few hours or days.

The expression "trigger mechanism" or "trigger reaction" is heard quite often as applied to industrial dermatitis, the worker having been exposed to some substance to which he is not demonstrably sensitive but which is credited with having set in motion a chain of immunologic events and phenomena which may incapacitate him for years or for life. I have seen many such instances, subsequently diagnosed neurodermatitis, infectious eczematoid dermatitis, and hypostatic dermatitis.

Recently I attended a young lady for a chronic generalized dermatitis which at times was exfoliative, and which, regardless of treatment had persisted for nearly six years. In about five months she was well and remained so by merely taking care not to irritate her skin by overbathing. She then took employment as a cook in a hotel and accidentally spilled hot soup on her feet. The burn on her feet healed in about a month but not before she had had a recurrence of the exfoliative dermatitis, from which, after four months she is still suffering. The new accident in this case was an example of the "trig-

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ger mechanism." It also exemplifies the adage, "The skin has a long memory, and, like an elephant, never forgets." In this instance the carrier is responsible for treatment of the exfoliative dermatitis until the patient has reached pre-accident status. Would a comprehensive pre-employment case history have avoided this unfortunate outcome? It might have, although the occupation of cook has never been considered particularly hazardous.

MANY dermatoses serve to confuse the diagnosis of industrial dermatitis; either they coexist, predispose to contact dermatitis or are aggravated by the industrial contactants. These include seborrheic dermatitis, psoriasis, lichen planus, dermatitis herpetiformis, nonindustrial impetigo, nonindustrial infectious eczematoid dermatitis, acne, herpes zoster, neurodermatitis, nonindustrial contact dermatitis, and nonindustrial fungous infections and bacterids. The latter two require special attention.

Fungous and bacterial allergy frequently cause much confusion in diagnosis and prognosis. Many workmen have fungous infections of the feet; they perspire a lot and as a result of poor hygiene develop dermophytids which may erupt on the palms, along the edges of their fingers, or even elsewhere. Care must be taken to evaluate the role of occupation in causing or aggravating the "id" reaction. In most states compensation laws disregard this "id" concept, accepting all such cases as compensable because of the law of "reasonable doubt." However in a few states the presence of a nonindustrial fungous infection automatically eliminates industrial responsibility for the "id" reaction.

Nevertheless, in all cases of dermatitis of the hands, the feet should be examined for presence of fungous infection. In selected cases a trichophytin intradermal test should be done. If there is clinical evidence of ringworm, scrapings should be taken. This should be done even though we know the patient has recently applied medication, and that, therefore, most likely, a negative result may be obtained.

In some states neurodermatitis is accepted as compensable. This has occasioned many controverted cases in other states.

As regards psoriasis two problems arise. First, we have the individual who has never had psoriasis. After working at a specific job for some time he develops it, the "initial" lesion located on his hands. Subsequently it appears elsewhere. Did irritation of his hands precipitate the attack of psoriasis, or was this merely coincidental? Decisions in New York have favored the former interpretation, and a number of psoriatics have been awarded "life pensions."

The second problem is the worker who has psoriasis, but no lesions on the hands. While working he develops a fissured dermatitis of his palms and lesions of psoriasis. Since this is a new site of involvement, is the worker entitled to compensation and treatment until his hands are free of lesions? According to law he is, since to a large measure trauma determines the site of the lesions; but the carrier is not responsible for treatment of psoriasis elsewhere on the skin.

Similar problems arise in the case of discoid lupus erythematosus. For example, an aluminum worker who had previously enjoyed apparently good health was accidentally burned on the cheek by the molten metal. A patch of lupus erythematosus appeared on the area within a few months. For this he was compensated and treated; but when additional lesions appeared a year later on his chin, the case was successfully controverted and adjudged not industrially related. This was a just decision.

Every few years some butcher gets ordinary pemphigus vulgaris and succumbs to the disease. Some member of the family, a friend or acquaintance in the legal profession, having read about "butcher's pemphigus" in some dermatological textbook, decides to establish industrial relationship. As a result it is remarkable what a consistent and logical history he is able to concoct: a cut of the finger while butchering meat, the chill, the fever, the lymphangitis, the family doctor, the bandage, and finally admission to the hospital. The "fly in the ointment" happens to be that this story was not fabricated until *after* hospitalization and death of the patient, so that the hospital history contained no record of a wound, but rather one of bullae appearing on the scalp and oral mucosa for two years before admission. The only resemblance of the story of the patient's heirs and attorney to the hospital history is that he was a butcher and that he died. It is difficult to understand how some practitioners will allow themselves to be involved in such deceit and chicanery. I recall one case in which I contributed to a successful controversion by pointing out that Section 146 of New York City Health Code makes the employer responsible for the good health of his employees and forbids allowing one with any infection to handle meat.

Several years ago I questioned a number of dermatologists regarding butcher's pemphigus. None of them had ever seen a case. Sulzberger[4] told me that he had first heard of the disease while studying in Switzerland. He was then of the opinion that all cases occurred in the United States, but he had, nevertheless, never in his life seen one. This case also serves to emphasize the importance of accurate hospital histories. These are often incomplete, lacking in dates and much information of importance to both patient and insurance carrier. The reason is they are frequently taken by undergraduate students,

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physicians, or residents unfamiliar with compensation medicine.

In recent years the role of trauma in causing herpes zoster has assumed new significance. Many instances of alleged relationship have appeared in compensation courts. Klauder[5] reported several, and discussed the problem in 1947.[6] Blank,[7] at the First Inter-American Conference on Industrial Medicine and Toxicology this past summer (1956); postulated that the virus is present and quiescent in a large sector of the population. It becomes activated through an unknown mechanism or following trauma. A foreign body in the eye, as from an abrasive, may cause zoster ophthalmicus culminating in blindness. The history in these cases is extremely important, as the trauma should be in the same somatic dermatome involved by the zosteriform eruption, and the latter should appear within the period of incubation (12-21 days). This problem of traumatic herpes zoster also illustrates the importance of dates in the patient's history; and how essential it is that every injury, no matter how trivial, be reported by the worker to his supervisor or foreman, who in turn should make a record of it.

Another problem in which history plays an important role is the relationship between trauma and cutaneous malignancy. Of course chronic trauma may terminate in cancer; likewise cancers arising in scars resulting from industrial injuries can certainly be called industrial. But in the case of cancer arising as a sequence of one industrial trauma the burden of proof should reside in the claimant. Minor injuries to the skin are common, whereas cancer at the site of trauma is rare. The claimant should be required to submit proof (1) that the area was normal before the alleged trauma; (2) that the trauma actually occurred; (3) that a sufficient "lag period" elapsed between the injury and development of the cancer; (4) that the cancer began at the exact site of the alleged trauma (this is very difficult to establish); (5) that histologically the lesion is malignant; and (6) that he has not had and does not have other similar malignancies of nontraumatic origin (e.g., solar epithelioma).

IN SUMMARY, I can assure you that comprehensive, accurate histories and physical examinations are highly appreciated by both industrial compensation boards and insurance carriers.

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Many Problems

ONE OF the dangers of atomic energy work — radiation exposure — creates many problems in workmen's compensation. One is that exposure may take place without the worker's knowledge. Another involves the question as to whether a worker may have become overexposed from sources other than his normal work, since effects of radiation are cumulative. The general rule, the Board found, regarding workmen's compensation is to set up a statute of limitations as to how long after an accident or illness connected with his employment a worker may apply for benefits. In no state can a worker collect for a radiation disease that occurs more than a specified length of time (maximum is usually three years) after he last worked with radioactive materials. Unions are trying to convince the states to lift their statute of limitations so that a worker can apply for workmen's compensation no matter how much time has elapsed since his last exposure on the job. Insurance executives point out that removal of the statute of limitations might open the door to claims as far removed as the second and third generation, on the basis of mutation changes caused by radiation. Setting workmen's compensation rates for such contingencies, they feel, is well-nigh impossible.

—National Industrial Conference Board.

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AN APPROACH TO
Radiation Health Problems in Industry

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General Motors Technical Center
Detroit, Michigan

ONE YEAR ago, at the Eighteenth Annual General Motors Medical Conference in Philadelphia, Dr. L. R. Hafstad offered us the challenge of becoming acquainted with the medical problems inherent in our transition from conventional concepts of power and energy to the concepts that will be pressed upon us in the age of nuclear power. Since then, I am sure that many of us have had time and occasion to study and reflect about the part that we, as physicians, can play in this age of nuclear power. During this year, some few of us have had to come to face with the problems of radiation medicine, and what we can and must be prepared to do when some member of our particular facility or plant sustains an overexposure to radiation, or suffers a wound contaminated with radioactive materials. In addition to the expansion of radioisotope research facilities, and the establishment of a nuclear power group at our Technical Center, other GM installations have adopted special techniques utilizing radioactive materials, for example, Harrison Radiator, Central Foundry, and Euclid Divisions.

If we are to be in a position to meet the problems that inevitably will arise with wider adoption of industrial techniques, using various forms of radioactive materials, a certain minimal knowledge of basic physical structure — atomic and subatomic or nuclear structure — is necessary. Far removed as we are from our courses in physics and chemistry, it would seem pertinent to begin with basic atomic structure, i.e., with the concept of a nucleus composed of protons and neutrons and its surrounding solar-like system of circling electrons.

THE SIMPLEST atom is that of ordinary hydrogen with one proton in its nucleus and one electron circling about in an orbit. The next is the helium atom with two protons and two neutrons in the nucleus, and two electrons circling in orbits. With the basic subatomic particles, protons, neutrons and electrons, atoms of all elements are constructed, and of these atoms, all material is composed. The proton is a positively charged particle with a definite weight — approximately the same as the weight of the neutron. However, as the name implies, the neutron is uncharged. The electron is a light (approximately 1/1800 the weight of a proton or neutron) negatively charged particle, the charge being equal but opposite in sign to that of the proton.

For all elements, the number of protons in the nucleus has been determined, and this number, called the atomic number, is equal to the number of electrons in the orbits surrounding the nucleus. The determination of relative or atomic weights of the various elements led to the discovery that, for a given element with a definite number of protons and electrons, different forms existed with different atomic weights, the difference being due to variation of the number of neutrons in the nucleus. These different forms of the same element, i.e., having the same atomic number but different atomic weights, are called isotopes. It was found that some isotopes spontaneously emitted radiation, and such isotopes became known as radioactive isotopes or radioisotopes.

With the introduction and definition of the terms isotopes and radioisotopes, it would be well to define in a general way what is meant by radiation. Simply stated, radiation is a physical phenomenon in which energy is transmitted through space even though that space be devoid of matter, i.e., a vacuum. This definition includes all forms of radiation, such as x-ray, sunlight, radio waves, alpha rays, gamma rays, etc.

Radiation, broadly speaking, may be classified as corpuscular radiation and electromagnetic radiation. As the name implies, corpuscular radiation consists of streams of particles which may be charged or uncharged; while electromagnetic radiation, which is radiation per se, exists as visible light, ultraviolet, infrared, x-rays, radio waves, etc., all of which are basically the same, differing only in frequency and wave lengths.

With this brief concept of radiation, now consider again the hydrogen atom with its one proton in the nucleus, and its one electron in an

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orbit. It is possible for another form of hydrogen to exist — in fact, to a very small degree, it exists in nature and can even be manufactured — known as deturium or heavy hydrogen, with one proton and one neutron in the nucleus. This form of hydrogen is stable, but a third form of hydrogen is possible, again with one extra nuclear electron and with one proton and two neutrons in the nucleus. This type of hydrogen, called tritium, is unstable, because too much energy exists in the nucleus, and tritium spontaneously changes to an isotope of helium, giving off energy in the form of beta rays as it does so. This spontaneous change of a radioisotope with the emission of energy is known as radioactive decay. The material left after decay may be stable, or may be another radioactive element which in turn decays, with the end product being a stable or nonradioactive element.

With the introduction of the term beta rays, it is appropriate to describe the types of radiation that are emitted when a radioisotope changes or decays. Very early, three types were encountered, alpha, beta, and gamma rays. Alpha rays and beta rays are examples of corpuscular radiation, being really helium nuclei and electrons respectively, while gamma rays are an example of electromagnetic radiation.

As the tritium defined earlier decays, beta rays are emitted at a definite rate and, if a known number of tritium atoms are set aside and later examined, it will be found that half will be left at the end of 12.4 years. This length of time is called the half-life. If we wait 12.4 more years, half of the remainder will be left. Every radioisotope has a definite characteristic half-life, and this is important in our clinical consideration as will be noted later.

Tritium, as mentioned, decays with the emission of beta particles or electrons; however, some radioisotopes decay with the emission of alpha rays or gamma rays or both. These emissions may vary markedly in the amount of energy which they carry, and this too is a factor to consider in clinical problems. In addition to the types of radiations discussed, in certain situations other corpuscular radiations such as neutrons or positrons are emitted. However, these are factors in special operations, and the bibliography can be consulted for further information concerning these particles.

WITH THIS brief resume of basic physics, what are the problems facing a Medical Director with the introduction of radioisotopes into his plant? First, the necessity of educating and calming personnel who are directly or indirectly involved in the handling, and use of the radioactive materials; and secondly, preparation for treatment of a patient who may be overexposed from external radiation, or internal radiation due to inhalation, ingestion, or absorption through wounds.

The first problem is frequently the more serious and the more difficult to manage. All forms of mass communication have successfully frightened much of our population, and many feel that any radiation is dangerous. Actually, it is preferable that no individual receive any radiation. However, for many years, the public has willingly accepted diagnostic x-radiation with little thought of the danger involved, which is not always negligible. Now, the public must be taught that acceptance of a certain minimal amount of radiation exposure is not going to debilitate the population because of cancer, or result in all our children being born with two heads.

The simple facts are that, with appropriate precautions, work with radioisotopes and nuclear power reactors can be safe, i.e., safe as compared to other industrial procedures. With employee education and careful attention to work supervision, safety, and industrial hygiene, fear among a plant population can be successfully combated, and the cooperation of involved personnel secured, except for the occasional person who congenitally goes the wrong direction.

Detection and careful measurement of radiation are obviously of the utmost importance, if one is to utilize radiation sources or to protect personnel from overexposure. With the tremendous variations that exist in the form and energies of radiation, many different approaches to detection and measurement are necessary. For x-ray and gamma rays, photographic film properly enclosed in a badge or ring holder is one technique of quantitative measurement. For the different types of corpuscular radiation, various electronic instruments have been developed for use in checking work areas, air, water, workers' clothes and bodies, etc. There are even tiny needle-like detector probes for checking the depths of wounds. Complete operational and theoretical discussions of the various types of instruments may be found in the literature.

Utilizing the experience of many years with x-ray and radium, various national and international organizations have arrived at standards of exposure, which are defined in the National Bureau of Standards Handbooks, and will not be discussed at this point because of the multiple definitions entailed. Suffice to say that actual danger to personnel working with radioactive materials in a modern, well-designed facility is very minimal, both in terms of immediate injury and long range genetic effects. We all receive some radiation from cosmic rays, and naturally-occurring radioisotopes, and, with the concept that any additional radiation is harmful, it is desirable to prevent to the fullest possible extent any exposure to personnel during their reproductive years. Long range mammalian

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genetic experience in this field is not available at this time, and extrapolation of geneticists' results with fruit flies and mice is not directly applicable to human population. The effects of radiation on man may be manifested clinically as genetic effects, cancer or leukemia, and shortening of the life span. As more data are accumulated and evaluated, these clinical manifestations can be better related to types and amounts of radiation exposure. The exposure standards currently in use are designed to prevent any appreciable or detectable damage; however, from clinical uses of radioisotopes, accidental exposures, and experience with radium and x-rays, these effects have been noted. The exposure received from various diagnostic x-radiation procedures is not to be discounted, because a patient receives approximately a four-month allowable dose during a routine lumbar spine series, allowable in view of the exposure standards that have been set up by governmental and international agencies. Ordinary 14 x 17 chest x-rays do not result in a significant exposure, and annual chest films should not be viewed with alarm even by personnel in nuclear research laboratories. However, it is obvious that fluoroscopy, GI series, etc., should be carefully considered, particularly during the reproductive years of a patient, regardless of work environment.

THE SECOND major problem facing the Medical Director with the introduction of radioisotopes into his plant is that of anticipating any possible accidents, and being in a position to cope with them, as there probably will be no other adequately informed physicians in the community. This will entail a knowledge of the materials being used, because there are marked differences in the behavior of the various radioisotopes, and hence there are marked differences in the hazards inherent in their use.

Several factors must be considered. For example, the amount of material; the type or types and energy content of emissions given off; the half-life; the fate of the material should it gain entrance to the body, and the ease with which it may be eliminated from the body, should it be ingested, and, of course, the conditions under which the materials are to be used.

Obviously, if an amount so small as to be completely innocuous is used, then no danger exists. However, the Medical Director should be familiar with any material in his plant, and the possible hazards involved. As mentioned earlier, radioisotopes differ in their manner of decay and the energies of their emissions, and if one is adequately to evaluate an exposed individual, the nature of the actual radiation or radiations involved is important. Iron-55 has a half-life of four years, and if a significant amount were in the body, obviously, damage from radiation would continue for a long period of time. However, some radioisotopes have a very short half-life, and if an isotope with a very short half-life is involved, this influences action to be taken particularly as regards efforts to hasten elimination of the material from the body.

The metabolism of most ordinary elements has been rather well studied, and the mechanisms by which the body handles iron, calcium, phosphorus, and iodine are well known. The metabolic behavior of a radioisotope does not differ from the metabolic behavior of the stable element, e. g., radioactive iodine is taken up by the thyroid in the same manner as nonradioactive iodine, and radioactive iron is utilized by the hematopoietic system in the same manner as is ordinary iron. Unfortunately, the exact metabolic fate of many radioactive elements, which are not ordinarily encountered in human studies, is not well known, although data are being accumulated, and on the basis of general physical and chemical properties the absorption, metabolic fate, and excretion can be predicted.

A common use of radioactive materials in industry, at the present time, is as source of gamma rays or beta rays (usually with a solid, readily-shielded form of the radioactive element or one of its salts) to determine thicknesses of materials or to detect structural flaws, e.g., the use of strontium-90 in beta gauges. Such use of materials is relatively free from hazards since standardization of enclosure techniques ordinarily protect personnel during transportation, storage, and use. However, as with most of man's tools, accidents can occur, and provision should be made for any eventuality.

Our prime interest is, of course, employee health protection, and, broadly speaking, this is accomplished best by protection from external radiation and control of radioactive contamination.

Protection from external radiation can usually be simply done by shielding, with attention to source distance and exposure time. With the rather considerable engineering experience to date, this does not present overly difficult problems.

Secondly, control of radioactive contamination — contamination simply being radioactive materials in the wrong places, whether in the atmosphere, on work surfaces, in the ground, or the wrong place, par excellence, in the human body.

Thus far, it has not been possible to engineer facilities for radioisotope research or nuclear power production without contamination appearing on the scene. The handling of individuals who sustain contaminated wounds, or inhale, or ingest radioactive material, is today a real medical problem.

If there is merely contamination of intact skin, then decontamination by one of several techniques is usually satisfactory. However, if a wound is involved, then the Medical Director

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must be in a position to treat the patient adequately, not only with a good surgical approach, but also taking into account the problem of absorption into the body of a dangerous amount of a radioisotope. Obviously, the amount involved, the half-life, the fate in the body, the rate of elimination, and whether or not the rate of elimination can be increased by appropriate means, must all be considered. For example, if an individual accidentally ingests what would be an above-tolerance dose of tritium, the material will be quickly absorbed from the gastrointestinal tract and distributed throughout the body in the form of water. However, by alternate water-loading and diuresis, the body burden of tritium can be rather quickly reduced.

For many isotopes, different therapeutic techniques aid in keeping the body burden to a minimum, by prevention of absorption from wounds or from the GI tract, or by increasing the elimination rate.

Prevention of absorption, or at least a decrease in the amount absorbed from a laceration or a puncture wound, can be effected by appropriate tourniquet application, preventing venous return but permitting arterial flow while thorough irrigation and evaluation of contamination are carried out. If the isotope be a particularly dangerous one, actual sacrifice of viable tissue in the wound area, by excision, may be necessary. Obviously, such a decision must be carefully considered.

TO SUMMARIZE, Medical Directors have in some instances, and are going to have in many instances, the problem of employee health protection in a relatively new and little understood field, the field of nuclear research and nuclear power.

Many of the safety, industrial hygiene, and medical approaches to the problem will be similar to those that we are familiar with in dealing with toxic materials generally; however, because of the tremendous toxicity of some radioactive materials, and many yet unsolved long-range problems, a special approach is required.

Fully to appreciate the inherent hazards, and to be in a position to cope with the problems that inevitably will arise, one should have some knowledge of the structure of matter, of the nature of radioactivity, and of the metabolic patterns of various isotopes. Current medical literature offers rather good specific details, and it is hoped that the attached bibliography will serve as a starting point for the physicians who must face this problem.

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Responsibility TO the Physician

AS THE largest group purchasers of medical care in the country, the trade unions have deep social responsibilities to help elevate the quality of patient care. It is not enough to join the popular chorus in the criticism of the practices of a minority of physicians. The responsibility of the physician to society has been well publicized. Perhaps now we should consider society's responsibility to the patient and the physician. American physicians average 55-60 hours of work per week. They are in a highly competitive field. They are frequently compelled to work under conditions which are not conducive to the highest level of medical practice. Good medical care requires that the physician have time to develop that personal relationship with his patient to which so much lip service is paid. The physician, perhaps more than any other member of society, must study his entire lifetime to keep up with scientific developments. He needs time for research and postgraduate study. He needs to be emancipated from the commercial pressures of practice. As an ever increasing number of physicians leave private fee-for-service practice to take salaried jobs with government and private agencies, our social responsibility to them increases. The trade unions have a large share in this responsibility. . . .

—From "Quality of Medical Care," by HERBERT K. ABRAMS, M.D., excerpts in *Public Health Economics,* June, 1957.

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The Third Lake Logan Conference on Occupational Health

Canton, North Carolina
May 17-19, 1957

IN THE mountains of North Carolina, near Asheville, 84 industrial executives and industrial physicians, in near equal number, assembled in sessions devoted to the health of the nation's industrial workers. This body, through design, is without formal organization and functions entirely on a discussional basis. In no degree was the group concerned with such items as the toxic properties of betaaminoethylimidazole, or the precise measurement of the quantum unit of light, the photon. More appropriately, but contrary to any self-designation, these 84 able-minded participants may be styled the practical philosophers of occupational health.

Explorations were conducted on a sectional basis, the six subgroups being created through self-choice. Respectively, these groups were mandated regarding deliberations as follows:

GROUP I. What are the social and economic forces at play that have led to the increasing demands for security, and, in turn, what are its implications for medical care programs?

GROUP II. What is the range of medical care to be delivered, and to whom shall it be delivered?

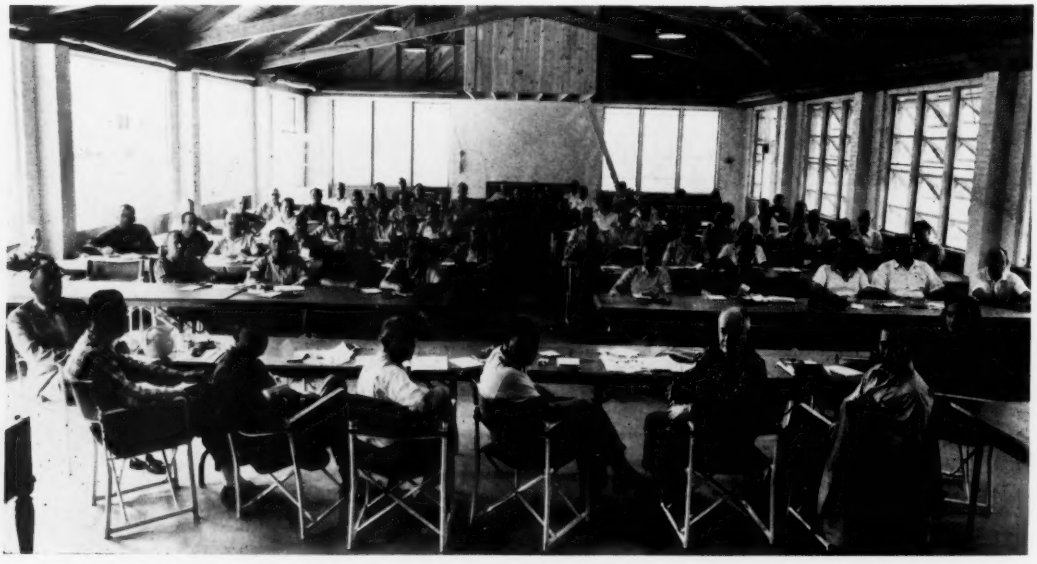
GROUP III. How should medical care be delivered?

GROUP IV. What is insurance, and what is insurable?

GROUP V. How should the cost of medical care be distributed?

GROUP VI. Who monitors medical programs, and how are abuses prevented?

The 15 members of Group I, being philosophers, avoided any attempt to define "security," and fully shunned any estimate that full security or demands for it are good or evil. It was recognized that demands for security are mounting within both the industrial population and the



Conference leaders from left to right: Henry H. Hewetson, Vice President, Standard Oil Company, Inc., (New Jersey); Jermyn F. McCahan, M.D., Medical Director, Liberty Mutual Insurance Company; W. W. Tudor, Vice President, Personnel and Employee Relations, Sears, Roebuck & Company; Edward L. Mitchell, Vice President, Provident Life and Accident Insurance Company; Charles Kluss, Partner, Edwin Shields Hewitt & Associates; William A. Sawyer, M.D., Medical Consultant, International Association of Machinists; Karl R. Bendetsen, Vice President, The Champion Paper and Fibre Company.

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general population. Some reasons for this were agreed upon:

The distress attending the depression years beginning in 1929, in which for millions there was no security, profoundly increased the nation's determination that similar economic episodes shall not recur.

Fourteen million men and women in uniform in World War II were accorded a measure of security, the procurement of which little rested upon the individual. Many of those individuals now want that same security in all places and under all circumstances.

Accessibility to increased communication, such as through urbanization, radio, television, has facilitated the spread of demands for security.

Labor unionization has fostered the security appeal.

Rapidly increasing populations for this country and for many other nations, with the prospect of even more rapid population expansion, inherently impose conditions in which the individual loses much, and, contrawise, brings added regimentation in which security more widely is expected.

Since 1932 much of the national philosophy has been directed to abandonment of measures toward individually-procured security in the interests of national economy, offset by promises and achievements in assured collective security.

More than ever, the people of the land, including the industrial population, have been manipulated to desire and expect security and without outstanding contributions by the individual in behalf of that wanted security. Many tens of thousands of persons from past happenings have come to know that however negligent of their affairs, however profligate, however undeserving, they will not be allowed to starve. No longer is there belief in the earlier effective pronouncement, "Root hog, or die."

From all such spring the demands for ever increasing security.

In connection with the estimation of the reasons for increasing demands for security over the land, it became almost inevitable that debate would attend the states of individual integrity as of the present in comparison with generations ago. Discussants avoided any definition of "integrity." It is noted that some automobile manufacturers, apart from their advertisements, are well aware that their products by no means are of the prideful quality of the 1920's, that some six times as much inspection work is required to overcome shiftless work, and that inspection itself it not without shortcomings. Many statements were made implying a widespread diminution in work faithfulness, simple work honesty, conservation of tools and materials. In time it was concluded that, fundamentally, workers of this period and people in general are no less dependable, trustworthy, reliable than in past generations, but that such qualities have assumed different forms, different manifestations, and different outlets. It was emphasized that loyalties have become diluted through many demands for portions of loyalty. In times past, the industrial worker was characterized by obvious and staunch loyalty to his employer, whom he saw daily as a person. In more recent decades this same loyalty has been partitioned, with a share going to his union, his community obligations, his possessions, and his social pursuits. In an earlier day the workman had little upon which to outpour his loyalty beyond his family, his country, and his employer. The worker's larger world has increased his opportunities for loyalties, and much that appears to represent waning loyalty or disloyalty and disintegration of integrity may be attributed to a dilution in such qualities, and not necessarily undesirable within the workman's broadened horizons.

Large fish are so numerous at Lake Logan that a small catch becomes the feature.

Some crossed fingers indicated complete dissent with this charitable appraisal, and some held firm conviction that evidence throughout the land indicates that at all levels — and certainly not confined to industrial workers — disintegration in integrity, sense of responsibility and reliability prevails; that this has far-reaching evil consequences and potentialities, and that no such is to be condoned through palliative appraisals.

In consideration of the motivations for these demands for added security it becomes evident that much is the result of manipulation. Manipulation is a word of not quite the evil connotation of "seduction," and perhaps in many situations is free of evil. Manifestly the objective of all advertising is the manipulation of the minds of readers and hearers to the point of succumbing to the wiles of the advertisers. All political campaigns are manipulative. All pursuits of public relations represent manipulation; and much in the devisations of human relations is not other

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Scientific discussions were not limited to the conference pavilion.

Reuben Robertson, Sr., center, proved to be the best of hosts and best of singers as well.

than manipulative. Denying again that all manipulation is evil, it is to be recognized that manipulation is the source for more and more security demands.

Unions manipulate their members in many directions, including the pursuit of security. Social service activities are highly active in manipulation of many of their clients toward added social benefits. Some such activities are carried out in behalf of their clients, and some of them in behalf of social service workers themselves. Of all manipulators, government is the archtype, and persons by the millions have been manipulated into demands for security, which, without manipulation, never would have been sought.

Viewing what has happened and what is happening in the demands for more and more security, this Conference, fully contrary to its own preferences but viewing the entire developments objectively, was forced to one conclusion of profound implication for the medical profession. This conclusion, reluctantly reached, was that the present trend in security demands could not but eventuate in some form and some degree of socialized medicine for the country. It appears to some that socialized medicine already exists. It was iterated that the social medicine prospective of the United States chiefly would consist of mere extension of what already has been brought about. Otherwise that that distasteful form of social medicine now imposed on the British Isles would not appear and was deemed fully undesirable. Despite the language of the foregoing sentence, which is not a quotation from any record, the Conference avoided any debate on the merits and demerits of any form of socialized medicine. No less, there were some who opposed any recognition that some form of social medicine lies ahead, on the ground that mere admission contributes to the actuality of its coming.

A LONG period of discussion was devoted to the respective merits of voluntary versus compulsory medical activities, on the industrial premises. The support for the volunteer enterprises was overwhelming. When some contended that the mere proffering of medical activities well deserving support met with as low as a 5% response, others insisted that the manner of presentation — the implementation of the endeavor — determined the outcome, and that any carefully devised promotion of a volunteer program frequently led to a 90 to 95% response.

In connection with certain projects involving voluntary physical examinations what was deemed to be a highly profitable development was the early fortuitous disclosure of an unsuspected severe condition in a few of the examinees. In one instance built around routine chest examinations for tuberculosis, the president of the corporation, the first volunteer, proved to be a victim of active tuberculosis. Although the Medical Department preserved this finding as confidential, the president himself revealed his state. After that, there was no lack whatever in volunteers. Another survey was directed to cancer detection in the female work population. By chance, among those first examined, several gave evidence beyond peradventure of malignancy. Fortunately all were in early states, all were amenable to curative measures. Thereafter, for the remaining women employees, it was not a question of their undergoing examination but, instead, how soon.

Scarcely may it be argued that the detection of definite and potentially disastrous findings in any survey — word of which always leaks out although victims by name are never disclosed by the Medical Department — represents medical promotion through "scare." The fact that one President of the United States was a victim of poliomyelitis, and this certainly was no secret,

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nas eventuated in measures that almost entirely may eradicate poliomyelitis in this country. The fact that another President of the United States, like all too many of the citizens he serves, developed a profound heart lesion has done more to focus remedial measures on that disease than any 10 years of educative effort on the part of the entire medical profession.

Notwithstanding the Conference advocacy of a volunteer procedure in industrial medical pursuits, inevitably there do exist many situations where compulsion must be exercised as a condition of employment. It is unthinkable that the examination of railroad engineers should be conducted on a volunteer basis. The same need for the compulsory attends many other industrial enterprises, for example, the radioactive isotope worker, the crane operator, the food handler, the aviation pilot, etc.

THIS CONFERENCE led to endless references to the highly increased costs of medical care. Some few statements were exaggerative. What was not clarified was that the medical costs centering about the individual physician have increased far less proportionately than almost all other services, and certainly less than the cost of commodities. It has been estimated that the individual physician's charges on an average have not increased by more than 28%. What has taken place is that under present systems of medicine the patient is likely to be seen by a larger number of physicians, all or many making their own proper charges for services. The outstanding increase in medical care costs relates to hospitals, which costs truly have mounted. In large measure that may be attributed to increased nonprofessional personnel salaries. By and large, the unit charges for laboratory items have little increased. In many hospitals the charge for a blood count is $5.00, which figure prevailed as long ago as 25 years. Again, the difficulty that ends up in total increased charges against the patient is that, at the present time, the number of informative laboratory procedures distinctly has increased.

One factor in this consideration widely is overlooked. At the present time there is disposition on the part of a few recalcitrant patients to find fault with medical services to the point of malpractice suits. Obliging jurors have seen fit to make awards against physicians, oftentimes when no award whatever was justified, at such high figures as to make malpractice insurance almost prohibitive. It is not unusual for suits to be filed demanding $200,000 or $500,000 when perhaps the total yearly income of the physician concerned does not exceed $30,000. This potentiality on the part of a few patients of ill will ultimately works a hardship on the many. The wary physician, mindful that any patient may find some cause for disaffection, is disposed to seek many consultations and many laboratory examinations, leaving no stone unturned; all such measures being of worth to the patient, but all serving as judicious protection of physicians against claimants. It is to such situations that much of the additional cost for medical care may be attributed.

THIS CONFERENCE was earnest in its espousal of preventive medical programs in industry, in hospitals, and in the community as a whole. It was observed that many workers are not always enthusiastic about preventive medical programs because inevitably they are referred to as patients, and written up on patient records and charts, when, in fact, they are hale and hearty. This gives support to this Journal's urging that a new word is needed to separate the truly sick and those believing themselves to be sick — those deserving the term "patient," from those others manifestly not "patients." This Journal has advocated the adoption of the word "valent" to identify those who consult the medical profession for reasons of health protection, not disease cure. The Latin "valere" from which comes "valent" means "to be strong." Ordinarily, workmen do not want to establish a medical record in the industrial dispensary, but few would object to the word "valent" when they understand fully the meaning of that good word.

NOT ALL of the Lake Logan Conference was devoted to the pontifical. Brief intervals led to sports, to recreation, to entertainment. Food was superb. Whether for work or play, the hosts for the Conference were Rueben B. Robertson, Sr., and Reuben B. Robertson, Jr., Chairman of the Board, and President, respectively, of the Champion Paper and Fibre Company. The Conference Co-Chairmen were Charles Kluss and Dr. David H. Goldstein.

Those sharing in the Lake Logan Conference were:

BAEHR, DR. GEORGE, President and Medical Director, Health Insurance Plan of Greater New York, New York City.

BARNES, JOHN M., Manager, Industrial and Community Relations, Champion Paper and Fibre Company, Canton, North Carolina.

BAUM, JOHN P., Vice President, J. P. Stevens & Company, Milledgeville, Georgia.

BENDETSEN, KARL R., Vice President and Division Manager, Champion Paper and Fibre Company, Pasadena, Texas.

BIBLER, DR. LESTER D., Committee on Industrial Medicine, American Academy of General Practice, Indianapolis.

BRADBURY, JOHN G., Executive Vice President, Southern Bell Telephone & Telegraph Company, Atlanta.

BRICKER, JOHN J., Director of Personnel, International Business Machines Corporation, New York City.

BRITTON, DR. JOHN B., Plant Physician, Champion Paper and Fibre Company, Canton, North Carolina.

BROOKS, DR. BERT W., General Practice, Upper Montclair, New Jersey.

BUCHAN, DR. RONALD F., Director of Employee Health, Prudential Insurance Company of America, Newark, New Jersey.

BUYNISKI, DR. EDWARD F., Manager—Health & Hygiene, Aircraft Gas Turbine Division, General Electric Company, Cincinnati.

CASHION, THOMAS B., Secretary, Plumbers' Welfare Fund, Chicago.

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CHRISTIAN, JOHN, Industrial Relations Department, Union Bag-Camp Paper Corporation, New York City.

COKER, CHARLES W., Executive Vice President, Sonoco Products Company, Hartsville, South Carolina.

COTTON, HORACE, President and Executive Director, Professional Management, Southern Pines, North Carolina.

DAY, DR. EMERSON, Director, Strang Cancer Prevention Clinic, New York City.

DRAPER, DR. WARREN F., Executive Medical Officer, United Mine Workers of America, Washington, D.C.

DUCHEIN, ANNETTE, Vice President, Spartan Mills, Spartanburg, South Carolina.

ECKARDT, DR. ROBERT E., Director, Medical Research Division, Esso Research and Engineering Company, Linden, New Jersey.

EVANS, DR. O. DREW, Medical Director, Occupational Health Center, Asheville, North Carolina.

FLACCUS, GEORGE E., JR., Vice President Industrial Relations, Jones & Laughlin Steel Corporation, Pittsburgh.

FORD, T. G., Director of General Industrial Relations, American Enka Corporation, Enka, North Carolina.

GIBBONS, JOHN L., Executive Vice President, Chemical Corn Exchange Bank, New York City.

GOLDSTEIN, DR. DAVID H., Medical Director, *The New York Times*, New York City.

HADAWAY, ERNESTINE, Assistant Industrial Relations Manager, Spartan Mills, Spartanburg, South Carolina.

HAYS, DR. SILAS B., Major General, U.S. Army, The Surgeon General, Washington, D.C.

HEWETSON, HENRY H., Vice President, Standard Oil Company, Inc., of New Jersey, New York City.

HOLT, DR. GEORGE F., Chairman, Industrial Relations Committee, National Association of Chiropodists, Asheville.

HULSART, C. RAYMOND, Assistant Secretary and Manager of Industrial Relations, The New York Times, New York City.

IRWIN, DR. DUDLEY A., Medical Director, Aluminum Company of America, Pittsburgh.

JOHNSON, DR. HARRY J., Director, Life Extension Examiners, New York City.

KALTENBORN, HOWARD S., Vice President, Industrial Relations Counselors Service, Inc., New York City.

KAMMER, DR. ADOLPH G., Department Head, Department of Occupational Health, Graduate School of Public Health, University of Pittsburgh.

KLUSS, CHARLES, Partner, Edwin Shields Hewitt & Associates, Libertyville, Illinois.

LAUER, DR. D. JOHN, Medical Director, Jones & Laughlin Steel Corporation, Pittsburgh.

LAWRENCE, DR. HANS W., Medical Director, The Procter and Gamble Company, Cincinnati.

LEVINSON, DR. HARRY, Director, Division of Industrial Mental Health, The Menninger Foundation, Topeka, Kansas.

LICHTER, DR. MAX, Chairman, Prepaid Medical Care Plans Committee, Wayne County Medical Society, Melvindale, Michigan.

MCCAHAN, DR. J. F., Medical Director, Loss Prevention Medical Service, Liberty Mutual Insurance Company, Boston.

MCCORD, DR. CAREY P., Editor, *Industrial Medicine and Surgery*, Ann Arbor, Michigan.

MCCREA, JOHN L., Vice President, John Hancock Mutual Life Insurance Company, Boston.

MALLERY, DR. O. TOD, JR., Medical Director, Employers Mutual Insurance Company, Wausau, Wisconsin.

MAY, JAMES R., Vice President and Treasurer, Veach-May-Wilson, Inc., Alcoa, Tennessee.

MEAD, STATES M., Organization Planning Officer, The Chase Manhattan Bank, New York City.

MILLER, DR. SEWARD E., Director, Institute of Industrial Health, University of Michigan, Ann Arbor, Michigan.

MITCHELL, EDWARD L., Vice President, Provident Life and Accident Insurance Company, Chattanooga, Tennessee.

MORGAN, DAVID B., JR., Executive Vice President, American Parboard Corporation, Black Mountain, North Carolina.

MORGAN, DUNCAN, Director of Human Relations, Daystrom, Inc., Murray Hill, New Jersey.

NADEL, LEONARD, Assistant Personnel Director, Abraham and Straus, Brooklyn, New York.

O'CONNOR, DR. ROBERT B., Medical Director, U. S. Steel Corporation, Pittsburgh.

ONSTOTT, HOWARD K., Assistant Vice President, American Telephone and Telegraph Company, New York City.

PERRIN, JAMES B., Industrial Relations Department, Libbey-Owens-Ford Glass Company, Toledo, Ohio.

PUTNAM, ROBERT J., President, Occupational Health Services, Inc., Asheville, North Carolina.

ROBERTSON, DR. LOGAN T., Consultant in Occupational Health, Asheville.

SARGENT, DWIGHT S., Personnel Director, Consolidated Edison Company of New York, New York City.

SAWYER, DR. WILLIAM A., Medical Consultant, International Association of Machinists, Rochester, New York.

SCHNEIDER, DR. RALPH F., Medical Director, Standard Oil Company, Inc., of New Jersey, New York City.

SEYMOUR, WILLIAM H., Vice President, Liberty Mutual Insurance Company, Boston.

SORKEY, DR. HERMAN A., Psychologist, Asheville, North Carolina.

STEPHENS, JOHN A., Vice President, Industrial Relations, U.S. Steel Corporation, Pittsburgh.

TABERSHAW, DR. IRVING R., Director, Health and Safety, Nuclear Development Corporation of America, White Plains, New York.

TAYLOR, JAMES H., Manager, Personnel Administration Department, Procter and Gamble Company, Cincinnati.

THALER, ALAN M., Associate Actuary, Prudential Insurance Company of America, Newark, New Jersey.

THOMPSON, DR. CHARLES E., Medical Director, Health Research Center, Chicago.

THURSBY, GEORGE, Vice President, Industrial Relations Administration, U.S. Steel Corporation, Pittsburgh.

THUSS, DR. WILLIAM, JR., Thuss Clinic for Industrial Medicine and Surgery, Birmingham, Alabama.

TUDOR, W. W., Vice President, Personnel and Employee Relations, Sears, Roebuck & Company, Chicago.

TURBEVILLE, H. E., Vice President and Director of Personnel, The Upjohn Company, Kalamazoo, Michigan.

TYROLER, DR. HERMAN A., Medical Director, Health Research Foundation, Asheville.

VEACH, JOHN B., President, Hardwood Corporation of America, Biltmore, North Carolina.

VISSER, LEONARD, Industrial Relations Department, Champion Paper and Fibre Company, Hamilton, Ohio.

WADE, DR. LEO J., Medical Director, Esso Standard Oil Company, New York City.

WELLS, DR. R. LOMAX, Medical Director, The Chesapeake and Potomac Telephone Companies, Washington, D.C.

WHITNEY, DR. L. HOLLAND, Medical Director, American Telephone and Telegraph Company, New York City.

WILSON, FRAZIER S., Manager, Insurance Division, United Air Lines, Chicago.

ZINK, VICTOR, Personnel Research, General Motors Corporation, Detroit.

FOUR YEARS ago, this unique Conference between equal numbers of industry's executives and industrial physicians was planned as a cautious medical-management experiment. It was known then, as it is known now, that no other assembly brings together free-speaking industrialists and industrial physicians under an equally provocative environment. Now, after three successive assemblies, the Lake Logan Conference no longer is an experiment. It has become an institution.

Industrial Nurse Movie

"THE ROLE of the Industrial Nurse" is a 15-minute, 16-mm color sound film that follows a newly employed industrial nurse through a variety of duties including physical examinations, management of medical records, treatment of industrial injuries and illnesses, health teaching, rehabilitation, safety education, and staff-education conferences. D. JOHN LAUER, M.D., Medical Director, Jones & Laughlin Steel Corporation, and MRS. JANE LEE, Supervisor of Nurses, served as Technical Advisers. The film is available, free, from Public Relations and Advertising Department, Jones & Laughlin Corporation, 3 Gateway Center, Pittsburgh 30.

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The British Association of Industrial Medical Officers

—*A Short Historical Review*—

A. MEIKLEJOHN, London, England

THE ENGLISH pub is no vulgar place; it is part of our heritage. Here for over 400 years men of all ranks have foregathered to gossip or exchange anecdotes, or, on occasion, to discuss brave new schemes. While it is peculiarly a meeting-place of Englishmen, Boswell is not the only Scot nor Swift the sole Irishman to have shared its pleasures.

So it happened that early in 1935, when the total number of whole-time medical officers in industry scarcely exceeded 20 and with no common meeting-place, two of them met in a pub one evening and decided to form a group for scientific study, social intercourse, and mutual help. In this friendly atmosphere the Association was conceived, and throughout the ensuing 21 years of its lusty growth it has been characterized by friendliness and sociability and an eager urge to advance the purpose of industrial medicine.

The first official meeting of the Association was held at the London School of Hygiene on September 27 and 28, 1935. It was a distinguished company — 18 in all — for, as proved by subsequent events, almost all of them have made a noteworthy contribution to the advance of industrial health not only in Great Britain but throughout the world. The proposed constitution of the new Association of Industrial Medical Officers was fully discussed and agreed by members. Dr. N. Howard Mummery, Medical Officer to J. Lyons and Company, Ltd., was elected Chairman, a title which was altered to President in 1947. Dr. Donald Stewart, Imperial Chemical Industries, Ltd., was appointed Honorary Secretary; there were no other office-bearers, but later Dr. Margaret Dobbie-Bateman, of Harrods, Ltd., was appointed Honorary Treasurer. The London School of Hygiene generously placed a room at the disposal of the Association for future meetings. This privilege is still enjoyed and marks the cordial relations which have always existed between the School and the Association. The first dinner was held in the School on the evening of September 27, and Professor Jameson (Later Sir Wilson Jameson), then Dean of the School, an enthusiastic supporter and one of the four original honorary members, was the guest of honor. On the second day of the meeting, Dr. Leonard P. Lockhart, Medical Officer of Boots Pure Drug Company, Ltd., presented a paper for discussion on "The Future of Industrial Medicine." His references to the relationship of the industrial medical officer to the general medical practitioner stimulated such a lively exchange of views that it was decided that a paper on the subject should be read at the next meeting.

The second quarterly meeting was held in January, 1936. Statistically-minded members may be interested to learn that it was unanimously agreed that a quorum at any meeting should be five ordinary members. It was further decided that for the time being ordinary membership should be confined to medical practitioners who held whole-time appointments.

The principle of holding an annual provincial meeting was established in May, 1936, when 23 members assembled at the Midland Hotel, Birmingham, and apart from the war years has continued since. In all, 14 Provincial Meetings, lasting three to four days, have been held.

By 1937, membership consisted of eight honorary members and 46 ordinary members, and the Association's influence was increasing as revealed by frequent invitations to assist government committees and other organizations in the development of occupational health services.

The outbreak of war made meetings difficult but it was decided to carry on as long as possible. Work in munition factories led to a great increase in the number of part-time doctors employed in industry. In March, 1941, a resolution was passed admitting part-time industrial medical officers to associate membership.

Local groups were formed in 1943 in order to advance the work of the Association at a time when traveling long distances to national meetings had become virtually impossible. There are now 11 local groups, covering the whole country, which hold frequent scientific meetings in addition to the meetings of the full Association held in London in March and October.

In October, 1943, Dr. John C. Bridge, having

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retired from his appointment as H. M. Senior Medical Inspector of Factories, was elected Chairman. From the outset medical officers of government departments have been active and enthusiastic members, but their valuable services were for many years obscured by the fact that, with rare exceptions, their official appointments did not permit them to act as officers of the Association.

In conjunction with the British Medical Association, the *British Journal of Industrial Medicine*, under the editorship of Dr. Donald Hunter, was published for the first time in January, 1944. Since then the *Journal* has established its worth and is now recognized as one of the leading scientific medical journals of the world. It incorporated the proceedings of the Association until the Association published its own *Transactions*.

The Association published the first number of its *Transactions*, under the joint total membership exceeding 400. The Ninth International Congress on Industrial Medicine met in London in September, 1948, and this marked a peak of endeavor in the Association's short history. Dr. T. E. A. Stowell was Chairman of the British Organizing Council. The Congress, which was attended by world leaders in the field of occupational medicine and hygiene, was an outstanding success and by general assent this was due to the brilliant organization and unremitting work of many members of the Association, particularly those of the London group. Since then, at Lisbon and Naples, many members have continued the friendships formed with foreign colleagues whom they first met in London, in 1948. They now look forward to another reunion at the Twelfth International Congress, to be held at Helsinki, July 1-6, 1957.

The Association published the first number of its *Transactions*, under the Joint editorship of Dr. G. F. Keatinge and Dr. H. Wyers, in April, 1951, being issued quarterly to all members and attracting 300 additional subscribers from countries all over the world. The forerunner of the *Transactions* was the privately circulated *Quarterly Bulletin* the first issue of which was published in September, 1948, at the conclusion of the Ninth International Congress of Industrial Medicine. In all, 10 numbers were published, the last in January, 1951.

The 75th Meeting of the Association was a joint meeting with the Association of Industrial Medical Officers of Ireland, and was held in Dublin in the Summer of 1955. The handsome gavel and stand, for use by the President at meetings, was a gift from our charming Irish colleagues and hosts. The members have recently themselves given the Presidential Jewel to the Association. It was presented to the President by Sir Wilson Jameson during the 21st Anniversary Meeting. Membership of the Association is now more than 820, but more significant than growth in numbers is the notable increase in prestige and influence. The Royal College of Physicians has elected members to deliver the Croonian, Goulstonian, Milroy, and Ernestine Henry lectures. The government constantly avails itself of the services of members on official committees.

Following the death of Dr. John C. Bridge, the Association decided to establish a Bridge Memorial Lecture to be given every two years. Dr. E. R. A. Merewether, Dr. A. Meiklejohn, Dr. S. W. Fisher, and Dr. L. G. Norman have so far delivered this Lecture. In addition, the British Medical Association graciously asked for the collaboration of the Association of Industrial Medical Officers in the presentation of the biennial Memorial Mackenzie Industrial Health Lecture.

During 21 years of activity much progress has been made in the development of industrial health services in factories and other places of employment. Much remains to be done, particularly in the fields of undergraduate and postgraduate medical education. The idea and aims of industrial health are also being increasingly brought into the education and training of undergraduates in engineering.

A new generation of members today salutes the founders of the Association and advances in good heart to meet the challenge of new industrial revolution. Industrial health may well prove to be the greatest single factor in preventive medicine in the next 50 years.

Skill Patterns

A LOOK at the world today suggests that a redefinition of skill is long overdue. Do the classical concepts of unskilled, semiskilled and skilled workers, largely taken over from a static, medieval society of guilds, really correspond to the needs of the dynamic, fast-changing industrial society of today? Will the 19th century concept of salary-earning office employees and wage-earning factory workers make sense in the automated factory of tomorrow? The skill of one technological era is dead, and the skill of a new era is just emerging.

—From Comment on "Automation and Labor," — Report by DAVID A. MORSE, ILO Director-General, in *ILO News*, April-May, 1957.

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Industrial Medical Association

President's Page

AS INDUSTRY expands, with the introduction of new materials and methods, the need for good occupational medicine increases. New problems arise that must be faced and studied; appropriate action must be recommended; such action must be realistically pursued. Your various Committees are charged with this responsibility.

Thirty of these Committees are listed in the front section of this Journal (see pages 6, *et seq.*). The Committees of all types now number 35, all reporting through specified lines of organization — some directly to the officers, and others through Board Members, who in turn report to a particular Officer. Officers and Board Members so assigned are responsible in respect to guidance and direction, and stand ready to offer assistance of which they are capable. Two Committees report directly to the President; 10 Committees through a pair of Board Members report to the President-Elect. One Committee reports directly to the First Vice President; five through a pair of Board Members, and another two, through a second pair, likewise report to the First Vice President. Five Committees report directly to the Second Vice President; and an additional Committee reports to him through another pair of Board Members. A complete organization chart, including the position of District Counselors, will be published later.

OUR ASSOCIATION IS MARCHING FORWARD. This is not just a phrase picked out of the air. Those whose privilege it was to attend the three-and-a-half-hour meeting of Committee Chairmen in St. Louis on April 22, witnessed living and indisputable evidence of the fact that ours is a dynamic not a static organization. There were 57 attending; all participated freely. The following are a few of the more important developments:

1. The Committee on Education and Training is to study the matter of recommending a special award in this area.

2. An adequate abstract service covering publications in our field is being considered by the Committee on Publications and Editorials.

3. The Committee on Cardiovascular Disease is particularly interested in, and plans to pursue, studies on the Relationship of cardiovascular disease to workmen's compensation, and current inadequacies of work classifications involving cardiacs.

4. The Committee on Problem Drinking is to have eight subcommittees, each with a Chairman from the Committee membership.

5. The American Standards Association's Liaison Committee Chairman pointed out that they need a number of physicians with special abilities to function when special problems are presented.

6. The Small Plant Services Committee indicated participation at the 1958 Industrial Health Conference with a program and exhibits.

7. The By-Laws Committee is working on further changes to propose for consideration at the next Annual Meeting.

8. The History Committee anticipates completion of the IMA history, and publication this fall.

9. The Board of Examiners for Fellowship is planning a bigger and better Fellowship Ceremony for 1958.

10. The Guiding Principles Committee (Committee on Committees) presented a formal report outlining the structure and functions of the IMA Committees. The work of this Committee will be described in a subsequent letter.

For the greater part, formal reports have been submitted by the various Committee Chairmen. These are to be published in the Journal and/or made available in the Managing Director's Office.

The Scientific Committees are on a "stand-by" basis, i.e., to answer, or attempt to obtain the answers to, various questions that IMA members may ask.

There are two newly-established Standing Committees — one on Radiation; the other on IMA Group Insurance. An additional Committee is to function in a liaison capacity between our Radiation Committee and the Bureau of Mines. Also there are two newly-established ad hoc Committees — one on Management Survey; the other on Life Membership.

Including all types of Committees, there are 18 newly-appointed Chairmen, with many changes, including additional appointments, in most Committee memberships. All our Committees stand ready not only to assist IMA and its members but also to assist industry in problems that are medical in nature — to the end of enhancing the well-being of our nation's more than 66,000,000 workers.

Jerome W. Shilling M.D.

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Letters

Disability Risk

TO THE EDITOR: The publication, by the AMA Council on Industrial Health, of the "Guiding Principles of Medical Examinations in Industry" (*J.A.M.A.*, July 7, 1956) presents a treatment of "Fitness Classification Methods" which, I believe, warrants further consideration. Accordingly, a discussion on this subject has been undertaken and is now set forth.

In its treatment of fitness classification, the "Principles" conveys the concept that health classification should depend upon the measurement of but one characteristic, namely, present ability to perform physical work functions. There is no recognition whatever that the characteristic of disability risk should also be reflected in health classification. By the term "disability risk" I am referring to the chance for additional disability which is present in (1) progressive disease, (2) conditions which predispose their host to disabling disease, (3) defects which so limit personal adjustment capacity as to reduce seriously the ability to avoid accident injury, and/or (4) quarantinable communicable disease.

That health classification should reflect disability risk as well as present work ability is indicated by the need of the employer to weigh such risk when considering his original hiring of an individual. So long as employers in a competitive, free enterprise system pay costs of workmen's compensation, nonoccupational sickness and accident insurance, life insurance, disability leave pay, and other costs deriving from employee illness and injury, *logic requires them to weigh disability risk* in the hiring of employees. And for those organizations which provide employees with disability insurance extending through catastrophic illness and injury and/or extraordinary amounts of life insurance, the matter of evaluating disability risk is of substantial importance.

An additional reason for reflecting disability risk in employee health classification is the convenient and efficient identification which it provides for employees whose health status requires continuing medical surveillance.

In practice, disability risk is widely taken into account in health evaluation but has encountered difficulty in finding joint classification with present ability to perform physical work functions. This difficulty occurs, I believe, in trying to classify the two characteristics on one scale of measurement.

Such classification would be feasible only if one of the characteristics were invariably and directly dependent upon the other — but this is not the case. Rather, they are independent variables and require separate scales for measurement. For example, early malignant hypertension may impose no current activity limitation but may be such as greatly to increase the likelihood of substantial disability costs and restricted activity in an individual's future working period. Similarly, diabetes mellitus may involve little or no activity limitation at present, but in predisposing to atherosclerosis, increases the chance for future disability costs and reduced flexibility in work assignments.

This does not mean that the characteristics of present ability to perform physical work functions and disability risk cannot be classified jointly. On the contrary, separate measurement of the two char-

HEALTH CLASSIFICATION CRITERIA

Classification Criterion	Class 1	Class 2	Class 3	Class 4
	Examinee conditions which are:	Examinee conditions which are:	Examinee conditions which are:	Examinee conditions which are:
(1) Present ability to perform physical work functions	Employable without restriction.	Employable with restriction(s) in job placement.	Employable. May or may not require restriction in job placement.	Unemployable. Not sufficiently controlled to permit regular employment.
(2) Disability Risk:				
(a) Progressiveness of disease states	Unlikely to progress to a degree requiring *any* restriction in job placement *when untreated.*	Unlikely to progress to a degree requiring *further* restriction in job placement *when untreated.*	Likely to progress to a degree requiring *further* restriction in job placement *when untreated.*	and/or
			and/or	
(b) Predisposition to disease or accident	Not significantly predisposing to disease or accident.	Not significantly predisposing to disease or accident.	Predisposing to significant chronic disease and/or accident.*	
(c) Communicability of disease	Not quarantinable.	Not quarantinable.	Not quarantinable.	Quarantinable.

*Includes specific defects which are such as seriously to limit physical adjustment ability.

acteristics may readily be coordinated in a joint rating, as shown in the following diagram:

		Disability Risk	
		Normal or Less	Above Normal
Present Physical Ability	Unrestricted Placement	Class 1	Class 3
	Restricted Placement	Class 2*	Class 4*
	Unemployable	Class 5	

* This classification to be supplemented with placement coding.

As may be seen, the separate measurement of disability risk gives an additional dimension to health rating. At the same time, the added dimension is coordinated with that of present ability to perform physical work functions so that both types of measurement may, with no sacrifice in accuracy, be incorporated in each health classification.

As previously indicated, classification of disability risk involves more than one type of consideration. The factors of progressive disease, predisposition to disabling disease, impaired emergency adjustment ability and communicable disease should each be taken into account, and any one or combination of these elements may require a classification indicating greater than normal disability risk.

The degree in which a disability risk factor must be present to require classification as "above normal disability risk" may be defined as that which exists when a professional appraisal of health status reveals (1) quarantinable communicable disease, and /or (2) a future need for permanent placement restriction greater than that currently required. On this basis, only the more profound disability potentials are significant. Progressive and predisposing conditions whose ultimate consequences are relatively minor do not require classification as "above normal disability risk."

The attached table of Health Classification Criteria illustrates the combined application of all of the preceding considerations on health classification. In prosaic form it provides for health classification under both the criteria "present physical ability" and "disability risk" — the bilateral method shown in the earlier diagram; sets out the individual factors involved in disability risk, and applies the disability risk definition described in the preceding paragraph. At the same time, it combines the previous health classes "3" and "4" into a single class "3," with the previous class "5" becoming class "4," as is shown in the following diagram:

		Disability Risk	
		Normal or Less	Above Normal
Present Physical Ability	Unrestricted Placement	Class 1	Class 3**
	Restricted Placement	Class 2*	
	Unemployable	Class 4	

* This classification to be supplemented with placement coding.

**This classification to be supplemented with placement coding only when current restriction in placement is indicated.

The reason for combining the previous classes "3" and "4" is simply to indicate that when health classification numbers are used with placement codings, it is unnecessary to have separate health classes to distinguish between those who have no activity limitations and those with activity limitations in the group having "above normal disability risk." This distinction is made by the presence or absence of placement coding after the health class number.

—Harry B. Burr,
Administrator, Medical Services,
Westinghouse Electric Corporation.

The Dedicated Individual

We are increasingly told that there is something "wrong" with the dedicated individual who, unstintingly, gives of himself to the utmost in whatever he does. He is often tagged as "unadjusted," and perhaps sent to a physician who dispenses a few tranquilizing drugs. It seems to us that the business of chopping everyone to fit the accepted norm not only robs the individual, but could also rob a nation of some of the drive it needs. A French auto race driver, interviewed after the death of another driver, has perhaps summed up the viewpoint of all the hard-driving, hard-driven personalities as well as anyone: "Only those who don't move, don't die. But since they do not move, they are already dead."

—From "The Dead and the Driving," Editorial in *The Wall Street Journal*, June 3, 1957.

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Books

Bringing Back to Life

RESUSCITATION (WIEDERBELEBUNG): PROF. DR. H. KILLIAN and PRIV.-DOZ. DR. A. DONHARDT. Georg Thieme Verlag, Stuttgart, 1955, pp. 320, with 93 illustrations (Price, 24 Deutsche Marken). German Language.

Bringing-back-to-life would constitute perhaps a more completely descriptive translation of this book's title in the light of the authors' broad concept of the subject presented. The authors refer to Flagg in observing that, in American medical circles the term, resuscitation, connotes only artificial respiration for prevention of an asphyxia threatening to life. They point to the definition of resuscitation given by Webster — to revive as from apparent death or unconsciousness — as representing their concept of the scope of the word. Accordingly this book includes the whole field of bringing back to life: the reanimation of the central functioning and autonomic regulating of the respiration, of the circulation, and of gas exchange and metabolism.

As may be expected from this broad application of the term, the authors present not only artificial respiration but also resuscitation of the circulatory system, handling of shock and collapse and of shock-kidney, together with a discussion of the principal forms of asphyxiation, including that caused by poisoning from hypnotics, by polio and tetanus, and by physical-thermal and electrical injuries.

Essentially equal portions of the work are devoted to the fundamentals of resuscitation, the technique of resuscitation, and special forms of asphyxia, and anoxia.

Lucid diagrams illustrate the systems under discussion, and their interrelation. Many of these were prepared for use in a recently published German text, "Narkose," coauthored by Dr. Killian, but their excellence fully justifies inclusion in this book. Photographs of several types of artificial respiration equipment as applied to patients are exclusively those of the one principal German producer, the Draeger Works.

Reference is made to two controversial phases of resuscitation: the question of whether application of positive and negative pressures to the respiratory tract is injurious, and whether the addition of 5% to 8% of carbon dioxide to oxygen in emergency artificial respiration apparatus is desirable. During the twenties and later, a number of physiologists strongly condemned the pulmotor principle, ascribing damage of the lung tissue to the induced pressure and a detrimental influence on the circulation to the suction cycle. The authors note that, on the basis of research both in Germany and in the United States, injury was not to be expected from the increased and decreased pressures induced by the apparatus. Concerning the use of 5% to 8% carbon dioxide as a respiratory stimulant for first-aid, the authors conclude their discussion with the statement that carbon dioxide cylinders should be omitted from emergency equipment as they cause more injuries than benefits. They acknowledge that carbon dioxide is of advantage in carbon monoxide asphyxiations, but consider it preferable to defer introduction of this gas with the oxygen until the victim is under medical attention at the clinic.

The book is of value as a comprehensive course in resuscitation, both theoretical and practical, and also as a reference work for information and instruction on the many specific phases of the subject treated by the authors. For physicians in this country it would be well to supplement the technical directions on use of artificial respiration apparatus employing the German equipment as given in this book with instruction manuals of apparatus currently in use in the United States even though there is much similarity in the principles employed. Extensive references to literature in English language publications as well as in the German are included.

—WARREN A. COOK

One for One

THE EFFECT OF THE NEW YORK WORKMEN'S COMPENSATION LAW UPON THE EMPLOYMENT OF THE HANDICAPPED: MORTON LANE. The Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center, 1956, pp. 53, pamphlet, $1.00.

In connection with this item, which is referred to as Rehabilitation Monograph XI, Dr. Howard A. Rusk is quoted as saying, "If we do not do something about utilizing all individuals over 65 or providing more opportunities for the disabled and the chronically ill to be trained to take their place in our economy, by 1980, for every able-bodied worker, there will be one disabled person on each laborer's back."

Since the labor force at work at that period may not be less than 80 million persons, the Rusk figure becomes appalling if allowed to become a fact. The thesis of this book is that if workmen's compensation is to play an admirable role in the matter, the conflicts between the compensation phase and the rehabilitation phase must be resolved.

An engaging part of this study centers in its author. "Mr. Lane, graduate of the University of Missouri School of Law with the degree LL.B. in 1938, was subsequently licensed to practice law in Missouri, Illinois, and New York. From 1938 through 1945 he practiced law in Chicago, and from 1946 until November, 1949, when he was stricken by poliomyelitis, he was a member of the legal department of Paramount Pictures Corporation. Since 1949, Mr. Lane, who is paralyzed from the neck down, has been confined to a full-body respirator; and since January, 1955, has been a patient at the New York Regional Respirator and Rehabilitation Center, Goldwater Memorial Hospital, a joint undertaking of the New York City Department of Hospitals, the National Foundation for Infantile Paralysis, and the Department of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center." This investigation was conducted within the respirator. It may be, after all, that there will not be one defeated person on every laborer's back.

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The Characteristic Occupational Diseases of Physicians

IN THIS period, more than one scientific publication has been directed to the health of the physician, the cause of his death, comparisons — decade by decade — of life with the general population and with others in preferred occupations. Some of the physician's diseases derive in part from the stress of his exacting pursuits, such as vascular impairments and gastrointestinal ulcers. Others such as threatening obesity are the product of his favored socioeconomic status. None such are peculiar to or characteristic of the physician. Stress is spread over many callings, and today's pay rates make it possible for the lowest elevator operator to acquire obesity, however undesirable that bulging state may be.

The physician's major sources of disability and death do not warrant cataloguing as occupational in origin. There remains the opportunity to inquire if there are any affections so identified as to causation with the physician, and those who work beside him, that the term "characteristic occupational disease" is warranted. The answer is affirmative, and some obvious ones are mentioned:

When the physician or the nurse acquires the communicable diseases of patients such diseases, ordinarily not occupational, become occupational and characteristically so. Tuberculosis is at high rate among physicians, nurses, medical students, and some classes of hospital employees. Exact proof of origin from patient exposure is established with difficulty, but much conjecture is justified.

The stress of the physician's work plus the ready availability of habit-forming drugs provide a high incidence of drug addiction in the medical profession. It is not proper to adjudge such states to constitute characteristic occupational diseases, but the incentive situations bring such states close to the occupational.

The requirements of skin sterility in the operating room and the requirements of tissue preservatives in pathology services introduce exposures of skin irritants and allergens peculiar to those specialties.

The most clearly delineated of all characteristic medical personnel exposures is that of radiation. The hazards introduced by radiological work ably have been summarized in *Therapeutic Notes* for May, 1957, now further epitomized:

'Certain disease processes, such as leukemia, anemia, agranulocytosis, cancer of the skin, and osteogenic sarcoma, have been induced by ionizing radiation in experimental animals and by accidental exposure in man, and may be considered occupational hazards for radiologists and others in contact with sources of radiation. Death rate from leukemia is about three times higher for all physicians than for the general population, and is considerably increased in physicians customarily exposed to radiation. Thus, 0.63% of deaths of physicians not exposed to radiation were due to leukemia, as against 3.65% for radiologists and 2.33% for other specialists having some contact with radiation.

'Radiologists and other radiation-exposed specialists have a shorter mean life span than non-radiation-exposed physicians, and also die younger from practically every cause of death. In 1950, the average age at death for United States males over 25 was 65.6 years; for physicians not exposed to radiation, 65.7 years; for specialists having some degree of exposure to ionizing radi-

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ation (gastroenterologists, phthisiologists and urologists, but not including dermatologists), 63.7 years; dermatologists who are reputedly somewhat more lax in protecting themselves against ionizing radiation than other specialists, 62.3 years; and radiologists 60.5 years.

'With the widespread use of fluoroscopy in chest and gastrointestinal examination, the rapid development of special x-ray procedures, such as angiography and cardiac catheterization, and the recent expanding use of radioactive isotopes, the potential hazard to radiologists and other physicians necessarily increases.'

The present standards for protection appear adequate, but more determined effort should be made to live up to them.

Senility by Persuasion

ONCE THERE was an old hag — unattractive, faded, a bit deaf, a bit blind, a bit decrepit. But the old hag didn't know she was an old hag. So she spent her days busily, productively, competitively. Then one day one of her trusted friends called her an old hag. She knew then she was an old hag and frustration consumed her.

Once the elderly board member attended the quarterly meeting on an icy, sleety day. The meeting over, the aging one slipped into his overcoat ready to move back to his own office two blocks away. Simultaneously the young clerk of the board slipped into his own overcoat saying "I am going with you to take your arm on a day like this. You are old but too valuable around here to take any risks." Tactfully the old one sent the clerk to collect the customary 50 dollar fee for board attendance. Then he skipped away to his office and into years of aged youthfulness.

Wickedly or possibly only thoughtlessly, but certainly wastefully, this country is creating a new category in its population, the "artificial seniles." All too true, past 50 and onward, by the tens of thousands men and women are genuine seniles, arthritic, prostatic, nephritic, gouty, hypertensive, cardiacs, petulant, witless, defeated. Hard to love, hard to accept — still do not ignore.

Senility breeds senility. The swiftest tempo of aging is an old folks' home. Snorting in derision at all those wicked devices artfully disguised by such names as "senior citizens' clubs," the hearty individual standing beyond the age of 65 does have a genuine perplexity. He poses to himself "Maybe I am slipping and don't know it, while everybody else knows it." The great need is for a faithful "senilometer," a device that unerringly appraises the state of mind and body for the aging. Standing on the platform of that infallible machine, the aging one presses the button and looks for the swinging dial to stop at some number from one to 10. Here is the scale:

If the reading is:

10. Look up the phone number of the neighborhood mortuary.
9. Send for the hospital ambulance.
8. Provide a wheeled chair.
7. Move to Florida.
6. Relegate to rose culture or watercolor painting.
5. Suggest three months vacation with pay. Not yearly. Just once.
4. Employ a first-rate understudy to take over 10 years hence.
3. Make a new five-year plan.
2. Redecorate office in modern colors and bring in a new, competent secretary, age 22.
1. Make chairman of the board of directors.

The best "senilometer" is the all-wise gerontologist, himself past 65, who knows his way through all the complexities of older minds and bodies. He will be the last to bring about senility through the wiles of persuasion. Time enough ahead to become the "grand old man."

Colleague and Consultant

I LOOK hopefully for the time in the not-too-distant future when each practicing physician, specialist and general practitioner alike, will have learned to be alert to the health problems involving occupation, will think twice or at least seek consultation before attributing a given ailment to occupation, will show appreciative respect for the opportunities for sound preventive medicine offered in industrial surroundings, and for the physician who devotes his specialized medical career to industrial medicine. When that time comes, the industrial physician, be he part-time or full-time in that field, will be a respected colleague and consultant who can be helpful to the attending physician in arranging work modifications upon return from illness, relieving stresses and hazards connected with occupation, often assisting with diagnosis by providing the medical aspects of the patient's work history, and helping all of organized medicine to uphold the unique values of the practice of medicine under the freedoms we enjoy in this country today.

—From "Industry Calling! Is There a Doctor in the House?" by W. P. SHEPARD, M.D., in *California Medicine*, November, 1956.